City of Boerne, Texas

Contract Documents and Specifications

for Construction of

Ammann Road GBRA Water Main Extension

100% DESIGN SUBMITTAL

April 2026

Kimley»Horn

TBPE Registration No. F-928

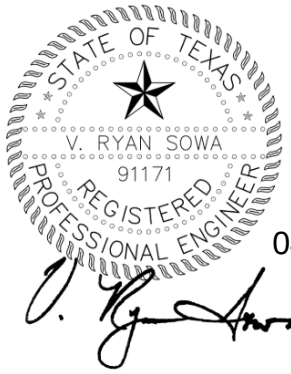
10101 Reunion Place, Suite 400
San Antonio, Texas 78216
210-541-9166

AMMANN ROAD –
GBRA WATER MAIN EXTENSION

CONTRACT DOCUMENTS

April 2026

Civil/Process



04/07/2026

V. Ryan Sowa
PE NO. 91171
KIMLEY-HORN AND ASSOCIATES, INC.
TBPE REG. NO. 928

AMMANN ROAD –
GBRA WATER MAIN EXTENSION

CONTRACT DOCUMENTS

April 2026

Electrical/Instrumentation & Control – Divisions 26 & 40

Steven Mouser
PE NO. 103671
GRUBB ENGINEERING, INC.
TBPE REG. NO. 3904

Contract Documents and Specifications
for Construction of

Ammann Road GBRA Water Main Extension

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ADVERTISEMENT FOR BID

Sealed Bids for the construction of the **AMMANN ROAD GBRA WATER MAIN EXTENSION** will be received by the City of Boerne Utilities Department, Attention: Taylor Hill, at 447 N Main Street, Boerne, Texas 78006, until 10:30am local time on May 21, 2026, at which time the Bids received will be publicly opened and read aloud utilizing a video conference, the details of which will provided at a later date.

The Project consists of all labor, equipment, and work for construction of the Base Bid and Alternate Bid: **AMMANN ROAD GBRA WATER MAIN EXTENSION**. This project is subject to all required utility and construction testing in accordance with the construction plans and City of Boerne specifications.

The Issuing Office for the Bidding Documents is **KIMLEY-HORN, 10101 REUNION PLACE, STE. 400, SAN ANTONIO, TEXAS 78216, AND (210) 541-9166**. Prospective Bidders may examine the Bidding Documents at the Issuing Office on Mondays through Fridays between the hours of **8:00 AM – 5:00 PM**. Plans and specifications may be viewed or downloaded free of charge from https://www.civcastusa.com, Project ID "**AMMANN ROAD GBRA WATER MAIN EXTENSION**". It is the bidder's responsibility to determine that a complete set of documents, as defined in the Agreement are received. Neither Owner nor Engineer are responsible for full or partial sets of Bidding Documents, including Addenda, obtained from sources other than the Issuing Office or https://www.civcastusa.com.

Bids will be received for a single prime Contract. Bids shall be on a unit price basis. Bid, payment, and performance bonds are required. City of Boerne reserves the right to reject any or all bids or waive any informalities in the bidding.

A pre-bid conference will be held in person at 10:00 AM local time on May 06, 2026, at 447 N Main Street, Boerne, Texas 78006. Attendance at the pre-bid conference is highly encouraged but is not mandatory.

All technical questions shall be submitted via https://www.civcastusa.com. The deadline for questions is 5:00 PM local time on May 11, 2026. Answers to all written questions received prior to the deadline will be posted to https://www.civcastusa.com on May 15, 2026.

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.

INSTRUCTIONS TO BIDDERS

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ARTICLE 1 – DEFINED TERMS

1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Certain additional terms used in these Instructions to Bidders have the meanings indicated below which are applicable to both the singular and plural thereof:

A. *Bidder* – one who submits a Bid directly to Owner as distinct from a sub-bidder, who submits a bid to a Bidder.

B. *Issuing Office* – the office from which the Bidding Documents are prepared and where the bidding procedures are to be administered. For this project the issuing office is **KIMLEY-HORN, 10101 REUNION PLACE, STE. 400, SAN ANTONIO, TX 78216, AND (210) 541-9166**.

C. *Successful Bidder* – the most qualified, responsible, and responsive Bidder to whom Owner (on the basis of Owner's evaluation as hereinafter provided) makes an award.

D. *Owner – the* Owner is understood to be City of Boerne.

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

2.01 Complete sets of the Bidding Documents may be downloaded from CivCast.com as indicated in the advertisement or invitation to bidders.

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

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

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

3.01 To demonstrate Bidder’s qualifications to perform the Work, each Bidder shall submit detailed written evidence establishing its qualifications such as financial data, proposed sub-contractors, present commitments, previous experience, equipment lists, evidence of authority to conduct business in the State of Texas and other such data as required to evaluate the Bidder's capability to perform the Work described in the Bidding Documents.

3.02 The Owner will select the most qualified contractor to perform the Work. The low bidder must demonstrate to the Owner that the low bidder has successfully completed four (4) similar projects meeting all of the following criteria:

A. All projects were completed under the direction of the same firm.

B. All projects are located in the Boerne and surrounding areas.

C. All projects have been completed within the last five (5) years.

D. All projects are similar to this Work in scope and in magnitude of cost.

3.03 The low bidder must present to the Owner a list of all subcontractors and their scope of work. The Owner retains the right to waive this requirement at the Council’s discretion.

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

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

3.06 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

ARTICLE 4 – SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OTHER WORK AT THE SITE

4.01 *Site and Other Areas*

A. The Site is identified in the Bidding Documents. By definition, the Site includes the lands upon which the Work is to be performed, 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.

B. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Bidding Documents.

C. Contractor will be responsible for security of construction facilities, construction equipment and construction material stored on-site and is to be paid by Contractor.

D. Contractor shall maintain and keep clean any construction areas occupied by Contractor and is to be paid by Contractor. Contractor is to leave any areas used for construction facilities, construction equipment, or storage of materials and equipment at equal or better condition than prior to the start of Work.

4.02 *Existing Site Conditions*

A. Subsurface and Physical Conditions; Hazardous Environmental Conditions

1. The Supplementary Conditions identify those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site which have been utilized by Engineer in preparation of the Bidding Documents. Bidder may not rely upon the data, interpretations, opinions, or information contained in such reports or otherwise relating to the subsurface conditions at the site, nor upon the completeness thereof for the purposes of bidding or construction.

2. Owner will make copies of the reports referenced above available to any Bidder on request. These reports are not part of the Contract Documents and are not a warranty of surface or subsurface 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.

3. Bidder acknowledges that Owner and Engineer disclaim any responsibility for the accuracy, true location, and extent of the soils, surface, and subsurface investigations that have been prepared by others and disclaim responsibility for Bidder's interpretation of or conclusions or opinions drawn from such reports, e.g., without limitations, projecting soil-bearing values, rock profiles, soil stability and the presence, level and extent of underground water. Bidder is expected to examine the site and such reports and then decide for itself the character of the materials to be encountered. Contractor shall not be entitled to an adjustment to the Contract Price or Contract Time for unanticipated surface or subsurface conditions

4. 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.

B. Underground Facilities

1. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or adjacent to the Site are based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, or others, and Owner and Engineer do not assume responsibility for the accuracy or completeness thereof or for Bidder's interpretation of or conclusions or opinions drawn from such information and data.

2. The Contractor is advised to coordinate closely with Engineer and Operator prior to the commencement of any underground construction activities. Such information and data is not a part of the Contract Documents and is not a warranty of subsurface conditions.

4.03 *Site Visit and Testing by Bidders*

A. Each Bidder will be responsible to obtain such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise, which may affect cost, progress, performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto or which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price and other terms and conditions of the Bidding Documents.

B. On request, the Owner will provide each Bidder access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a 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.

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

4.04 *Other Work at the Site*

A. Reference is made to 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 for which a Bid is to be submitted. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder for examination, access to or copies of Contract Documents (other than portions thereof related to price) for such work, if any.

ARTICLE 5 – BIDDER'S REPRESENTATIONS

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

A. examine thoroughly and carefully study the Bidding Documents, and any other related data and reference items identified in the Bidding Documents;

B. visit the Site to become familiar with and satisfy itself as to the general, local, and Site conditions that may affect cost, progress, performance, or furnishing of the Work;

C. consider and become familiar with all federal, state, and local Laws and Regulations that may affect cost, progress, performance, or furnishing of the Work;

D. study and carefully correlate Bidder's knowledge and observations with the Bidding Documents and such other related data;

E. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder;

F. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work; and

G. agree that the submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 6 – PRE-BID CONFERENCE

6.01 A pre-Bid conference will be held at the time and location stated in the invitation or advertisement to bid. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference. Engineer will transmit to all prospective Bidders of record such Addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

ARTICLE 7 – INTERPRETATIONS AND ADDENDA

7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all parties recorded as having received the Bidding Documents. Questions received after the designated deadline for questions may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

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

ARTICLE 8 – BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of five percent of Bidder’s maximum Bid price (determined by adding the base bid and all alternates) and in the form of a certified check or a Bid bond (on the form included in the Bidding Documents) issued by a surety meeting the requirements of Paragraphs 6.01 and 6.02 of the General Conditions.

8.02 The Bid security of the apparent Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 10 days after the Notice of Award, Owner may annul the Notice of Award and the Bid security of that Bidder will be forfeited.

8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.

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

ARTICLE 9 – CONTRACT TIMES

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

ARTICLE 10 – LIQUIDATED DAMAGES

10.01 Provisions for liquidated damages, if any, are set forth in the Agreement.

ARTICLE 11 – RETAINAGE

11.01 An amount equal to five percent of the amount of each monthly estimate (in accordance with current state laws) will be retained by the Owner until final payment under the Contract is approved.

ARTICLE 12 – PERMITS

12.01 The successful bidder shall be responsible for obtaining all required permits, including, but not limited, to the following:

A. No permits are anticipated for this project.

ARTICLE 13 – SUBSTITUTE AND "OR-EQUAL" ITEMS

13.01 The Contract for the Work, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or "or-equal" items. In cases in which the Contract allows the Contractor to request that Engineer authorize the use of a substitute or "or-equal" item of material or equipment, application for such acceptance will not be considered by Engineer until after the Effective Date of the Contract. The procedure for submission of any such application by Contractor and consideration by Engineer is set forth in Paragraphs 7.04 and 7.05 of the General Conditions.

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

ARTICLE 14 – SUBCONTRACTORS, SUPPLIERS, AND OTHERS

14.01 A Bidder shall be prepared to retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of the Work if required by the Bidding Documents (most commonly in the Specifications) to do so. If a prospective Bidder objects to retaining any such Subcontractor, Supplier, or other individual or entity, and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.

14.02 The apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of the Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which such identification is required.

If requested by Owner, such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, or other individual or entity. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute without an increase in price.

14.03 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next most qualified, responsible, and responsive Bidder that proposes to use acceptable Subcontractors, Suppliers, or other individuals or entities. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to revocation of such acceptance after the Effective Date of the Agreement as provided in Paragraph 7.06 of the General Conditions.

14.04 No Contractor shall be required to retain any Subcontractor, Supplier, or other individual or entity against which Contractor has reasonable objection.

ARTICLE 15 – PREPARATION OF BID

15.01 The Bid Form is included with the Bidding Documents.

A. All blanks on the Bid Form shall be completed in ink or typed and the Bid Form signed in ink. All names shall be printed in ink or typed below the signatures.

B. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.

C. 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.”

15.02 A Bid by a corporation shall be executed in the corporate name by the president or a vice-president (or other corporate officer accompanied by evidence of authority to sign), and the corporate seal must be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation must be shown below the signature.

15.03 A Bid by a partnership shall 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 below the signature.

15.04 A Bid by a limited liability company shall be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the firm’s address for receiving notices shall be shown.

15.05 A Bid by an individual shall show the Bidder’s name and address for receiving notices.

15.06 A Bid by a joint venture shall be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture’s address for receiving notices shall be shown.

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

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

15.09 The Bid shall contain evidence of Bidder's authority and qualification to conduct business in the state where the Project is located. Bidder's state contractor license number, if any, shall also be shown on the Bid Form.

15.10 The bid price shall include such amount as the Bidder deems proper for overhead and profit.

ARTICLE 16 – BASIS OF BID

16.01 *Unit Price*

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

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

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

ARTICLE 17 – SUBMITTAL OF BID

17.01 A Bid shall be received no later than the date and time prescribed and at the place indicated in the advertisement or invitation to bid and shall be enclosed in an opaque sealed envelope with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid shall be addressed to Attention: Taylor Hill, 447 N. Main St., Boerne, Texas 78006. Bids may also be submitted online at *https://www.civcastusa.com/.* 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 18 – MODIFICATION AND WITHDRAWAL OF BID

18.01 A Bid may be modified or 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.

18.02 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid,

and the Bid security will be retained by the Owner. Thereafter, if the Work is rebid, that Bidder will be disqualified from further bidding on the Work.

ARTICLE 19 – OPENING OF BIDS

19.01 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 20 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

20.01 All Bids will remain subject to acceptance for 60 days after the day of the Bid opening, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 21 – EVALUATION OF BIDS AND AWARD OF CONTRACT

21.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner will reject the Bid of any Bidder that Owner believes would not be in the best interest of the Project to make an award to that Bidder, whether because the Bid is not responsive or the Bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by Owner. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.

21.02 If Owner awards the contract for the Work, such award shall be to the most qualified, responsible, and responsive Bidder whose evaluation by Owner indicates to Owner that the award will be most advantageous to Owner and result in the best and most economical completion of the Project.

21.03 If the contract is to be awarded, Owner will give Successful Bidder a Notice of Award within sixty days after the day of the Bid opening.

21.04 In evaluating Bids, Owner will consider the qualifications of Bidders, compliance 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.

21.05 In evaluating whether a Bidder is responsible, Owner may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, individuals, or entities must be submitted as provided in the Bidding Documents. Owner may also consider the operating costs, maintenance requirements, performance data and guarantees of major items of materials and equipment proposed for incorporation in the Work when such data is required to be submitted prior to the Notice of Award.

21.06 Owner may conduct such investigations as Owner deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors, Suppliers, individuals, or entities.

ARTICLE 22 – BONDS AND INSURANCE

22.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds and insurance. When the

Successful Bidder delivers the executed Agreement to Owner, it shall be accompanied by required performance and payment bonds and insurance documentation.

ARTICLE 23 – SIGNING OF AGREEMENT

23.01 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unexecuted counterparts of the Agreement along with all other Contract Documents as identified in the Agreement. Within 10 days thereafter, Successful Bidder shall execute and deliver the required number of counterparts of the Agreement and attached documents to Owner with the required bonds. Within 10 days thereafter, Owner shall deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents.

ARTICLE 24 – SALES AND USE TAXES

24.01 Owner is exempt from Texas sales and use taxes pursuant to Texas Tax Code § 151.309 as a political subdivision of the State of Texas. Owner shall provide Contractor with a completed Texas Sales and Use Tax Exemption Certification as evidence of the applicability of such exemption and, accordingly, Contractor shall not collect Texas sales and use taxes from Owner with respect to this contract.

24.02 Contractor and all subcontractors to Contractor shall issue a Texas Sales and Use Tax Exemption Certification with respect to, and shall not pay Texas sales and use taxes on, all purchases of the following items that are exempt from Texas sales and use taxes pursuant to Texas Tax Code §151.311:

A. tangible personal property that will be incorporated into Owner's realty;

B. tangible personal property that is necessary and essential for the performance of this contract and is consumed entirely on the job site; and

C. taxable services for use in the performance of this contract that are performed at the job site and are either integral to the performance of this contract or expressly required to be provided by this contract.

24.03 In addition, Contractor and all subcontractors to Contractor shall not include any provision for Texas sales and use taxes with respect to such exempt items in any bid or contract amount and shall pass on to the Owner cost savings due to the exempt status of such exempt items. Contractor's contracts with all subcontractors to Contractor shall include the foregoing provision regarding the exemption from Texas Sales and use taxes.

ARTICLE 25 – WORKERS' COMPENSATION INSURANCE COVERAGE

25.01 Definitions

A. Certificate of coverage ("certificate") - A copy of a certificate of insurance, a certificate of authority to self-insure issued by the Texas Workers' Compensation Commission (the "TWCC"), or a coverage agreement (TWCC-81, TWCC-82, TWCC-83, or TWCC-84), showing statutory workers' compensation insurance coverage for the person's or entity's employees providing services on a project, for the duration of the project.

B. Duration of the project - includes the time from the beginning of the work on the project until the Contractor's/person's work on the project has been completed and accepted by the governmental entity.

C. Persons providing services on the project ("subcontractor" in Section 706.096 of the Texas Labor Code) - includes all persons or entities performing all or part of the services the Contractor has undertaken to perform on the project, regardless of whether that person contracted directly with the Contractor and regardless of whether that person has employees. This includes, without limitation, independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity or employees of any entity which furnishes persons to provide services on the project. "Services" include, without limitation, providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include activities unrelated to the project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

25.02 The Contractor shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreement, which meets the statutory requirements of Texas Labor Code, §401.011 (44) for all employees of the Contractor providing services on the project, for the duration of the project.

25.03 The Contractor must provide a certificate of coverage to the Owner prior to being awarded the contract.

25.04 If the coverage period shown on the Contractor's current certificate of coverage ends during the duration of the project, the Contractor must, prior to the end of the coverage period, file a new certificate of coverage with the Owner, showing that the coverage has been extended.

25.05 The Contractor shall obtain from each person providing services on the project, and provide to the Owner:

A. a certificate of coverage, prior to that person beginning work on the project, so that the Owner will have on file certificates of coverage showing coverage for all persons providing services on the project; and

B. no later than seven days after receipt by the Contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project;

25.06 The Contractor shall retain all required certificates of coverage on file for the duration of the project and for one year thereafter;

25.07 The Contractor shall notify the Owner in writing by certified mail or personal delivery, within 10 days after the Contractor knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project;

25.08 The Contractor shall post on each project site a notice, in the text, form and manner prescribed by the TWCC, informing all persons providing services on the project that they are required to be covered, and stating how a person may verify current coverage and report failure to provide coverage.

25.09 The Contractor shall contractually require each person with whom it contracts to provide service on a project to:

A. provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code §401.011 (44) for all its employees providing services on the project, for the duration of the project;

B. provide to the Contractor, prior to that person beginning work on the project, a certificate of coverage showing that coverage is being provided for all employees of the person providing services on the project, for the duration of the project;

C. provide the Contractor, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project;

D. obtain from each other person with whom it contracts, and provide to the Contractor:

1. a certificate of coverage, prior to the other person beginning work on the project; and

2. a new certificate of coverage showing extension of the coverage period, prior to the end of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the project;

E. retain all required certificates of coverage on file for the duration of the project and for one year thereafter;

F. notify the Owner in writing by certified mail or personal delivery, within 10 days after the person knew or should known, of any change that materially affects the provision of coverage of any person providing service on the project; and

G. contractually require each other person with whom it contracts to perform as required by paragraphs (1) - (7), with the certificate of coverage to be provided to the person for whom they are providing services.

25.10 By signing this contract or providing or causing to be provided a certificate of coverage, the Contractor is representing to the Owner that all employees of the Contractor who will provide services on the project will be covered by workers' compensation coverage for the duration of the project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the TWCC's Division of Self-Insurance Regulation. Providing false or misleading information may subject the Contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions.

25.11 The Contractor's failure to comply with any of these provisions is a breach of contract by the Contractor which entitles the Owner to declare the contract void if the Contractor does not remedy the breach within ten days after receipt of notice of breach from the Owner.

ARTICLE 26 – LABOR CLASSIFICATION AND MINIMUM WAGE SCALE

26.01 Chapter 2258 of the Texas Government Code provides that any political subdivision of the State of Texas shall determine the general prevailing wage rate received by the classes of workers employed on projects similar to this project and shall specify in the call for bids and in the Contract the applicable minimum wage rates. The statute further provides that the Contractor or Subcontractors shall pay, as a penalty, to the Owner Sixty Dollars ($60.00) for each worker employed for each calendar day or part of the day that the worker is paid less than the wage rates stipulated in the Contract. The Owner is authorized to withhold from the Contractor the amount due under Contract.

26.02 Chapter 2258 of the Texas Government Code requires that the Contractor and Subcontractors keep an accurate record of the name and occupations of all persons employed by them in the construction of the Project and to show the actual per diem wages paid to each worker. These records are open to the inspection of the Owner.

26.03 The minimum wage rates that apply to this Contract are those in effect at the time the bids are received. Contractor agrees to review and ascertain such wage rates and to pay at least such minimum rates.

ARTICLE 27 – CONFLICT OF INTEREST

27.01 Effective January 1, 2006, Chapter 176 of the Texas Local Government Code ("Chapter 176") mandates the disclosure of certain items by contractors doing business with or proposing to do business with local government entities, including municipal utility districts, road utility districts, road improvement districts, levee improvement districts, drainage districts, water control and improvement districts, bayou improvement districts, regional water authorities, fresh water supply districts, management districts, tax increment reinvestment zones, development authorities, etc.

27.02 Bidders should review Chapter 176 with their attorney and, if required, return the attached completed FORM CIQ with their Bid. The following is a list of the Board of Directors of Owner to facilitate Bidder's compliance with Chapter 176.

City Council

Frank Ritchie, Mayor
Ty Wolosin, Mayor Pro Tem, District 1
Joe Bateman, District 2
Kyle Mickelson, District 3
Bret Bunker, District 4
Joseph Macaluso, District 5

ARTICLE 28 – HOUSE BILL 1295

28.01 Definitions

A. A *governmental entity* is a municipality, county, public school district or special purpose district or authority.

B. A *business entity* is any entity recognized by law through which business is conducted, including a sole proprietorship, partnership or corporation, regardless of whether the entity is a for-profit or nonprofit entity. The term does not include a governmental entity or state agency.

C. An *interested party* is (i) a person who has a controlling interest in a business entity with whom a governmental entity or state agency contracts; or (ii) a person who actively participates in facilitating a contract or negotiating the terms of a contract with a governmental entity or state agency, including a broker, intermediary, adviser, or attorney for the business entity.

D. A *controlling interest* is defined as: (i) an ownership interest in a business entity by virtue of units, percentage, shares, stock, or otherwise that exceeds 10 percent, (ii) membership on the board of directors or other governing body of a business entity of which the board or other governing body is composed of not more than 10 members, or (iii) service as an officer of a business entity that has four or fewer officers, or service as one of the four officers most highly compensated by a business entity that has more than four officers.

E. An *intermediary* is a person who actively participates in the facilitation of a contract or negotiating a contract, including a broker, adviser, attorney or representative of or agent

for the business entity who: (i) receives compensation from the business entity for the person's participation; (ii) communicates directly with the governmental entity or state agency on behalf of the business entity regarding the contract; and (iii) is not an employee of the business entity.

28.02 The Texas Legislature passed House Bill 1295 during the 84th Legislative Session, which enacted Section 2252.908, Government Code, imposing new requirements for contracts entered into by governmental entities. More specifically, a business entity must disclose certain interested parties, intermediaries, and controlling interests when seeking any contract that is in excess of $1 million or requires an action or vote by the governing body before a governmental entity may enter into the contract. Business entities are required to fill out and notarize disclosure forms promulgated by the Texas Ethics Commission (TEC). A governmental entity cannot enter into a contract until proper disclosure forms are received. HB 1295 potentially affects all contracts entered into by water districts, including construction contracts, consultant and service contracts and bond-related contracts.

28.03 Compliance with HB 1295 fundamentally changes the process of how business entities and water districts enter into contracts. The TEC has formulated rules and the attached FORM 1295, resulting in the following prescribed process:

A. The business entity accesses the TEC website and completes an online FORM 1295, making all necessary disclosures required by HB 1295. (Some of the information needed for the business entity to complete FORM 1295 will be provided by the governmental entity.)

B. The TEC website then generates a "confirmation number" and a PDF version of FORM 1295.

C. The business entity then executes and notarizes a hard copy of FORM 1295 and submits it, along with the "confirmation number," to the governmental entity on or before the award of the contract.

D. The governmental entity then has 30 days to access the TEC website and confirm receipt of FORM 1295 by entering the confirmation number.

CERTIFICATE OF INTERESTED PARTIES — FORM 1295

Complete Nos. 1 - 4 and 6 if there are interested parties. Complete Nos. 1, 2, 3, 5, and 6 if there are no interested parties.	**OFFICE USE ONLY**

1 **Name of business entity filing form, and the city, state and country of the business entity's place of business.**

2 **Name of governmental entity or state agency that is a party to the contract for which the form is being filed.**

3 **Provide the identification number used by the governmental entity or state agency to track or identify the contract, and provide a description of the services, goods, or other property to be provided under the contract.**

4 Name of Interested Party	City, State, Country (place of business)	Nature of Interest (check applicable)	
		Controlling	Intermediary

5 **Check only if there is NO Interested Party.** ☐

6 **AFFIDAVIT**

I swear, or affirm, under penalty of perjury, that the above disclosure is true and correct.

_____
Signature of authorized agent of contracting business entity

AFFIX NOTARY STAMP / SEAL ABOVE

Sworn to and subscribed before me, by the said _____, this the _____ day of _____, 20 _____, to certify which, witness my hand and seal of office.

_____ _____ _____
Signature of officer administering oath | Printed name of officer administering oath | Title of officer administering oath

ADD ADDITIONAL PAGES AS NECESSARY

Form provided by Texas Ethics Commission www.ethics.state.tx.us Revised 4/8/2016

BID FORM

AMMANN RD GBRA WATER MAIN PROJECT
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ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

City of Boerne

447 N Main Street

Boerne, Texas 78006

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 and furnish all Work as specified or indicated in the Bidding Documents for the Bid price and within the Bid Times indicated in this Bid and in accordance with the terms and conditions of the Bidding Documents.

1.03 Bidder will sign and deliver the required number of counterparts of the Agreement with the Bonds and other documents required by the Bidding Requirements within 10 days after the date of Owner's Notice of Award

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the Bid opening.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

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

Addendum No.	Date Received	Acknowledgement

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

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

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

C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and

D. Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner

ARTICLE 5 – BASIS OF BID

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

BASE BID: AMMANN RD GBRA WATER MAIN EXTENSION PROJECT

Item No.	Description	Estimated Quantity	Unit	Bid Unit Price	Bid Price
BASE BID					
1	Tie-In to Existing 24" Water Main	1	LS		
2	16" PVC DR-14 C900 Water Line (Restrained)	5,071	LF		
3	DI Fittings, MJ, C153	2.13	TONS		
4	16" Gate Valve Assembly	3	EA		
5	Trench Safety Protection	5012	LF		
6	36" Steel Casing with Carrier Pipe (Jack and Bore)	59	LF		
7	2" Air Release Valve Assembly, Type 1	2	EA		
8	Drain Valve Assembly	1	EA		
9	Gravel Driveway Repair	95	SY		
10	Asphalt Driveway Repair	82	SY		
11	Pipe Fence Repair	95	LF		
12	Decorative Wood and Wire Fence Repair	95	LF		
13	16' Swing Gate	4	EA		
14	Hydrostatic Testing	1	LS		
15	Tracer Wire Test Station	10	EA		
16	Traffic Control and Street Signage – Water Main	1	LS		
17	Soil Erosion and Sediment Control – Water Main	1	LS		
18	Topsoil and Seeding – Water Main	15,747	SY		
19	Site Clearing and Preparation – Water Main (Max 5% of Items 1 - 18)	1	LS		
20	Mobilization (Max of 10% of items 1 to 18)	1	LS		
BASE BID SUBTOTAL (ITEMS 1-20)					$

Item No.	Description	Estimated Quantity	Unit	Bid Unit Price	Bid Price
SA1 - SUBSTITUTIVE ALTERNATE BID – 18" Water Main					
2A	18" PVC DR-14 C900 Water Line (Restrained)	5,071	LF		
3A	DI Fittings, MJ, C153	2.58	TONS		
4A	18" Gate Valve Assembly	3	EA		
SUBSTITUTIVE ALTERNATE BID SUBTOTAL (ITEMS 1, 2A-4A, 5-20)					$

Note: The above Alternate Bid Items shall account for any and all costs associated with the increase of pipeline diameter from 16" to 18".

Item No.	Description	Estimated Quantity	Unit	Bid Unit Price	Bid Price
AA1 - ADDITIVE ALTERNATE BID 1 – Delivery Point					
21	Delivery Point Site and Facility Improvements	1	LS		
22	Delivery Point Electrical, Instrumentation & Control, and SCADA Improvements	1	LS		
23	Electrical Service Allowance	1	ALW	$30,000.00	$30,000.00
ADDITIVE ALTERNATE 1 BID SUBTOTAL (ITEMS 21-23)					$

Note: The above Alternate Bid Items shall account for any and all additional costs associated with the delivery point site and facility.

Item No.	Description	Estimated Quantity	Unit	Bid Unit Price	Bid Price
AA2 - ADDITIVE ALTERNATE BID 2 – Future Ammann Rd Crossing					
24	36" Steel Casing (Open Cut)	312	LF		
ADDITIVE ALTERNATE 2 BID SUBTOTAL (ITEM 24)					$

Note: The above Alternate Bid Items shall account for any and all additional costs associated with the installation of 24" steel casing across the future ROW of Ammann Road.

BID TOTALS	
BASE BID + AA1 + AA2	**$**
SA1 + AA1 + AA2	**$**

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

5.02 **Pay Items**: Any and all work specifically called for in the Contract Documents or which is required for the proper construction of items called for in the Contract Documents is to be performed by Contractor unless specifically indicated otherwise. The cost of all work for which there is no separate pay item in the proposal shall be included in the price for a related pay item such that work called for or required by the Contractor Documents will be constructed for the Contract Price.

The following descriptions are intended to clarify the nature of work required for this project, the provisions of the standard technical specifications shall apply, except as otherwise noted herein:

"Each pay item includes all labor, material, equipment and incidentals necessary to construct that item. The contract shall be awarded based on the "TOTAL BID" for the funding that the Owner has budgeted."

5.03 **Pay Item Descriptions:**

Item 1: Tie-in to Existing 24" Water Main (Lump Sum)

Item to include all labor, materials, excavation, bedding, backfill, disinfection, and other incidentals required to connect the proposed water line to the existing system at the connection point noted in the plans. Measurement for payment shall be lump sum.

Item 2: 16" PVC DR-14 C900 Water Line (Linear Feet)

Item shall include the material and installation of 16" C900, DR-14 Polyvinyl Chloride (PVC) water pipe by open cut method. The bid item will also include: restraint, tracer wire, detection tape, excavation, selected embedment material, backfill, compaction, compaction testing, polyethylene sleeve, hauling and disposition of surplus excavated material, and other required testing per the excavation trenching and backfill specification. This item shall also include disinfection and all other testing requirements per the specifications not covered by other bid items. Measurement for payment shall be per linear foot of 16" water line installed.

Item 2A: 18" PVC DR-14 C900 Water Line (Linear Feet)

Item shall include the material and installation of 18" C900, DR-14 Polyvinyl Chloride (PVC) water pipe by open cut method. The bid item will also include: restraint, tracer wire, detection tape, excavation, selected embedment material, backfill, compaction, compaction testing, polyethylene sleeve, hauling and disposition of surplus excavated material, and other required testing per the excavation trenching and backfill specification. This item shall also include disinfection and all other testing requirements per the specifications not covered by other bid items. Measurement for payment shall be per linear foot of 18" water line installed.

Item 3: DI Fittings, MJ, C153 (Tons)

Item shall include the material and labor for the installation of ductile iron fittings, including both flanged and mechanical joint connections as part of the proposed water main and delivery point. This items also includes any required restraints and thrust blocking. Measurement for payment shall be per ton based on the published weights for ductile iron fittings.

Items 3A: DI Fittings, MJ, C153 (Tons)

Item shall include the material and labor for the installation of ductile iron fittings, including both flanged and mechanical joint connections as part of the proposed water main and delivery point. This items also includes any required restraints and thrust blocking. Measurement for payment shall be per ton based on the published weights for ductile iron fittings.

Item 4: 16" Gate Valve Assembly (Each)

Item to include excavation, bedding, backfill, tracer wire, valve, valve box, materials, labor, equipment and appurtenances to install a complete and operational valve assembly. Measurement for payment shall be per each valve installed.

Item 4A: 18" Gate Valve Assembly (Each)

Item to include excavation, bedding, backfill, tracer wire, valve, valve box, materials, labor, equipment and appurtenances to install a complete and operational valve assembly. Measurement for payment shall be per each valve installed.

Item 5: Trench Safety Protection (Linear Feet)

Item to include all components of the trench excavation safety protection system which can include, but is not limited to, sloping, shoring, dewatering or temporary diversion and proper recapture and transportation of water to provide drainage. Item shall also include additional excavation and backfill required, any jacking, jack removal and removal of the trench supports after completion, and for all other labor, material, tools, equipment and incidentals necessary to complete this portion of the work. Measurement for payment shall be made per linear foot regardless of depth of the trench.

Item 6: 36" Steel Casing with Carrier Pipe (Jack and Bore) (Linear Feet)

Item shall include 36" steel casing pipe, jacking and boring of casing pipe, grouting in place of carrier pipe, 16" C900, DR14 PVC carrier pipe, welding of casing pipe and all appurtenances construction and work required in the contract documents. Measurement for payment shall be per linear foot of casing installed.

Item 7: 2" Air Release Valve Assembly (Each)

Item to include excavation, bedding, backfill, valve, tracer wire, materials, labor, equipment and appurtenances to install 2" air release valve assemblies in accordance with the contract documents. Measurement for payment shall be per each air release valve assembly installed.

Item 8: Drain Valve Assembly (Each)

Item to include excavation, bedding, backfill, valve, tracer wire, materials, labor, equipment and appurtenances to install drain valve assemblies in accordance with the contract documents. Measurement for payment shall be per each drain valve assembly installed.

Item 9: Gravel Driveway Repair (Square Yards)

Item shall include all materials and labor required for the demolition of existing driveways, excavation, subgrade preparation, construction of a new gravel driveway to existing condition or better. Measurement for payment shall be per square yard.

Item 10: Asphalt Driveway Repair (Square Yards)

Item shall include all materials and labor required for the demolition of existing driveways, excavation, subgrade preparation, construction of a new asphalt driveway to existing condition or better. Measurement for payment shall be per square yard.

Item 11: Pipe Fence Repair (Linear Feet)

Item shall include all materials and labor for demolition of existing fence and construction of new fencing. Measurement for payment shall be per linear foot of fencing.

Item 12: Decorative Wood and Wire Fence Repair (Linear Feet)

Item shall include all materials and labor for demolition of existing fence and construction of new fencing. Measurement for payment shall be per linear foot of fencing.

Item 13: 16' Swing Gate (Each)

Item shall include all materials and labor for the removal of any existing fencing and the installation of a 16' swing gate as per the contract documents. Measurement for payment shall be per installed gate.

Item 14: Hydrostatic Testing (Lump Sum)

Item to include hydrostatic testing of all installed piping, valves and appurtenances per City/GBRA requirements. Measurement for payment shall be lump sum. Should any test fail, no payment will be made for additional testing.

Item 15: Tracer Wire Test Station (Each)

Item to include the installation of tracer wire test stations and testing of all installed tracer wire per City/GBRA requirements. The payment shall include all valves, pipes, fittings, pressure gauge, pumping equipment and other apparatus incidentals needed to conduct the test. Measurement for payment shall be per test station.

Item 16: Traffic Control and Street Signage – Water Main (Lump Sum)

Item to include the planning, implementation, and removal of the traffic control plan for the installation of 16" water main as described in the contract documents and meeting all applicable regulations. Measurement for payment shall be lump sum.

Item 17: Soil Erosion and Sediment Control – Water Main (Lump Sum)

Item to include the preparation, implementation, permitting, inspections, and reporting associated with the required Storm Water Pollution Prevention Plan for the 16" water main installation to meet the requirements of this contract and all applicable regulations. Measurement for payment shall be lump sum.

Item 18: Topsoil and Seeding – Water Main (Square Yards)

Item to include materials, labor, and equipment for the preparation, establishment, and maintenance of vegetation in areas disturbed by construction activities as part of the 16" water main installation, per the contract documents. Measurement for payment shall be square yards of established vegetation.

Item 19: Site Clearing and Preparation – Water Main (Lump Sum)

This item shall be for all work in clearing and preparing the water line easement, including the furnishing of all materials, equipment, tools, labor, tree pruning, removal, protection, landscape impacts, and incidentals necessary to complete the 16" water main installation. Measurement for payment shall be on a lump sum basis.

Item 20: Mobilization

This item shall be for the mobilization and demobilization costs associated with the Ammann Road GBRA Water Main Extension scope. This shall include furnishing all labor, materials, tools, equipment and incidentals required to mobilize, demobilize, bond and insure the Work, in

accordance with the contract documents, complete in place. All of this work shall be performed in accordance with the Plans and Technical Specifications. Measurement for payment shall be on a lump sum basis.

Item 21: Delivery Point Site and Facility Improvements (Lump Sum)

Item to include all labor, materials, equipment, and other incidentals associated with the installation, testing, and start-up of a potable water delivery point. All piping, fittings, appurtenances, paving within and adjacent to the site, foundation, structures, etc. are considered inclusive to this line item. All work associated with the installation of 16" water main up the proposed delivery point fence line is excluded from this line item. This work shall generally encompass all improvements within the proposed delivery point site, except as otherwise noted in the pay items. This pay item will also include the mobilization and demobilization for the delivery point improvements. The measurement for payment shall be lump sum.

Item 22: Delivery Point Electrical, Instrumentation & Control, and SCADA Improvements

Item to include all labor, materials, equipment, and other incidentals associated with the installation, testing, and start-up of electrical improvements in support of the proposed site, and delivery point. These improvements will include electrical distribution system, SCADA, wiring, duct banks, exothermic welding, and testing. Measurement for payment shall be lump sum.

Item 23: Electrical Service Allowance (Allowance)

Item shall be an allowance for payment to Pedernales Electric Cooperative for the work associated with the installation of new PEC infrastructure on the site to provide electrical service. Allowance may also be used for costs associated with temporary electric service, if necessary. Measurement for payment shall be on an as-approved basis. All requests for use of this allowance shall be made by the Contractor and approved in advance by the Owner and Engineer based on actual PEC invoices provided by the Contractor.

Item 24: 36" Steel Casing (Open Cut) (Linear Feet)

Item shall include 36" steel casing pipe, excavation, backfill, compaction, grouting in place of carrier pipe, welding of casing pipe and all appurtenances construction and work required in the contract documents. Measurement for payment shall be per linear foot of casing installed.

ARTICLE 6 – TIME OF COMPLETION

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

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

ARTICLE 7 – ATTACHMENTS TO THIS BID

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

A. Required Bid security;

B. List of Proposed Subcontractors;

C. List of Proposed Suppliers;

D. List of Project References;

E. Evidence of authority to do business in the state of the Project;

F. Contractor's License Number; and

G. Required Bidder Qualification Statement with supporting data.

ARTICLE 8 – DEFINED TERMS

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

ARTICLE 9 – BID SUBMITTAL

9.01 It is understood that in the event the successful bidder fails to enter into the Contract and to furnish a Performance Bond and Payment Bond in the amount of 100 percent of the Contract and for all parts of the Work, as specified in the Instructions to Bidders, the Bidder will forfeit the bid surety, as provided in the Contract Documents.

9.02 The undersigned proposes, if awarded the contract, to begin Work as stipulated in the written Notice to Proceed issued by the Engineer, and to substantially complete the Work as stipulated in the Agreement.

BIDDER:

_____

By:
[Signature] _____

[Printed name] _____

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

Attest:
[Signature] _____

[Printed name] _____

Title: _____

Submittal Date: _____

Address for giving notices:

_____

_____

_____

Telephone Number: _____

Contact Name and e-mail address: _____

_____

Bidder's License No.: _____

BID BOND

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

BIDDER *(Name and Address)*:

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

OWNER *(Name and Address)*:

BID

Bid Due Date:

Description *(Project Name— Include Location)*:

BOND

Bond Number:

Date:

Penal sum _____ $ _____

(Words) (Figures)

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

BIDDER	SURETY
_____ (Seal)	_____ (Seal)
Bidder's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	By: _____
Signature	Signature (Attach Power of Attorney)
_____	_____
Print Name	Print Name
_____	_____
Title	Title
Attest: _____	Attest: _____
Signature	Signature
_____	_____
Title	Title

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

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder any difference between the total amount of Bidder's Bid and the total amount of the Bid of the next lowest, responsible Bidder that submitted a responsive Bid as determined by Owner for the work required by the Contract Documents, provided that:

   1.1 If there is no such next Bidder, and Owner does not abandon the Project, then Bidder and Surety shall pay to Owner the penal sum set forth on the face of this Bond, and

   1.2 In no event shall Bidder's and Surety's obligation hereunder exceed the penal sum set forth on the face of this Bond.

   1.3 Recovery under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.

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

3. This obligation shall be null and void if:

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

   3.2 All Bids are rejected by Owner, or

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

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

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

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

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

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

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

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

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

"General Decision Number: TX20260258 01/02/2026

Superseded General Decision Number: TX20250258

State: Texas

Construction Type: Building

County: Kendall County in Texas.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Modification Number	Publication Date
0	01/02/2026

ASBE0087-014 06/03/2024

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR (Duct, Pipe and Mechanical System Insulation)	$ 29.50	8.79

BOIL0074-003 01/01/2025

	Rates	Fringes
BOILERMAKER	$ 33.17	24.92

BRTX0005-006 06/01/2025

	Rates	Fringes
BRICKLAYER	$ 25.50	8.12

ELEC0060-003 05/26/2025

	Rates	Fringes
ELECTRICIAN (Communication Technician Only)	$ 37.45	18%+5.45

ELEC0060-004 05/26/2025

	Rates	Fringes
ELECTRICIAN (Excludes Low Voltage Wiring)	$ 37.45	18%+5.45

ELEV0133-002 01/01/2025

	Rates	Fringes
ELEVATOR MECHANIC	$ 51.59	38.435+a+b

Footnote:
A. 6% under 5 years based on regular hourly rate for all hours worked. 8% over 5 years based on regular hourly rate for all hours worked.

B. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving

Day, Christmas Day, and Veterans Day.

ENGI0450-002 04/01/2024

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
Cranes	$ 39.47	10.39

IRON0066-013 06/01/2025

	Rates	Fringes
IRONWORKER, STRUCTURAL	$ 27.95	8.03

IRON0084-011 06/01/2024

	Rates	Fringes
IRONWORKER, ORNAMENTAL	$ 28.26	8.13

PLUM0142-009 07/02/2025

	Rates	Fringes
HVAC MECHANIC (Electrical Temperature Control Installation & Unit Installation Only)	$ 38.97	11.48
PIPEFITTER (Including HVAC Pipe Installation)	$ 38.97	11.48
Including HVAC Pipe Installation		
PLUMBER	$ 38.97	11.48
Excludes HVAC Pipe Installation		

SFTX0669-002 04/01/2025

	Rates	Fringes
SPRINKLER FITTER (Fire Sprinklers)	$ 38.57	24.47

SHEE0067-004 07/01/2025

	Rates	Fringes
Sheet metal worker		
Excludes HVAC Duct Installation	$ 34.10	16.10
HVAC Duct Installation Only	$ 34.10	16.10

SUTX2014-034 07/21/2014

	Rates	Fringes
CARPENTER (Acoustical Ceiling Installation Only)	$ 18.00	0.00
CARPENTER (Form Work Only)	$ 13.63	0.00
CARPENTER, Excludes Acoustical Ceiling Installation, Drywall Hanging, Form Work, and Metal		

Stud Installation	$ 14.83	1.73
CAULKER	$ 15.00	0.00
CEMENT MASON/CONCRETE FINISHER	$ 22.27	5.30
DRYWALL FINISHER/TAPER	$ 13.81	0.00
DRYWALL HANGER AND METAL STUD INSTALLER	$ 15.38	0.00
ELECTRICIAN (Low Voltage Wiring Only)	$ 20.19	3.75
IRONWORKER, REINFORCING	$ 12.27	0.00
LABORER: Common or General	$ 10.00	0.00
LABORER: Mason Tender - Brick	$ 12.00	0.00
LABORER: Mason Tender - Cement/Concrete	$ 12.00	0.00
LABORER: Pipelayer	$ 11.00	0.00
LABORER: Roof Tearoff	$ 11.28	0.00
LABORER: Landscape and Irrigation	$ 8.00	0.00
OPERATOR: Backhoe/Excavator/Trackhoe	$ 19.43	3.49
OPERATOR: Bobcat/Skid Steer/Skid Loader	$ 14.00	0.00
OPERATOR: Bulldozer	$ 14.00	0.00
OPERATOR: Drill	$ 14.50	0.00
OPERATOR: Forklift	$ 13.06	0.00
OPERATOR: Grader/Blade	$ 19.30	0.00
OPERATOR: Loader	$ 13.90	0.00
OPERATOR: Mechanic	$ 18.75	5.12
OPERATOR: Paver (Asphalt, Aggregate, and Concrete)	$ 16.03	0.00
OPERATOR: Roller	$ 11.25	0.00
PAINTER (Brush, Roller and Spray), Excludes Drywall Finishing/Taping	$ 13.13	0.00
ROOFER	$ 12.00	0.00
TILE FINISHER	$ 11.32	0.00
TILE SETTER	$ 16.09	0.00
TRUCK DRIVER: Dump Truck	$ 12.39	1.18

TRUCK DRIVER: Flatbed Truck.....$ 19.65 8.57

TRUCK DRIVER: Semi-Trailer Truck.....$ 12.50 0.00

TRUCK DRIVER: Water Truck.....$ 12.00 4.11

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least $13.30 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2025. The applicable Executive Order minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under Executive Order 13658 is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than ""SU"", ""UAVG"", ?SA?, or ?SC? denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

?SU? wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the

state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the ?SA? identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

a) a survey underlying a wage determination
b) an existing published wage determination
c) an initial WHD letter setting forth a position on a wage determination matter
d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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END OF GENERAL DECISION
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"General Decision Number: TX20260007 01/02/2026

Superseded General Decision Number: TX20250007

State: Texas

Construction Type: Heavy

Counties: Atascosa, Bandera, Bastrop, Bell, Bexar, Brazos, Burleson, Caldwell, Comal, Coryell, Guadalupe, Hays, Kendall, Lampasas, McLennan, Medina, Robertson, Travis, Williamson and Wilson Counties in Texas.

HEAVY (excluding tunnels and dams, not to be used for work on Sewage or Water Treatment Plants or Lift / Pump Stations in Bell, Coryell, McClennon and Williamson Counties) Construction Projects

Modification Number	Publication Date
0	01/02/2026

SUTX2011-006 08/03/2011

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER (Paving and Structures)	$ 12.56	
ELECTRICIAN	$ 26.35	
FORM BUILDER/FORM SETTER		
Paving & Curb	$ 12.94	
Structures	$ 12.87	
LABORER		
Asphalt Raker	$ 12.12	
Flagger	$ 9.45	
Laborer, Common	$ 10.50	
Laborer, Utility	$ 12.27	
Pipelayer	$ 12.79	
Work Zone Barricade Servicer	$ 11.85	
PAINTER (Structures)	$ 18.34	
POWER EQUIPMENT OPERATOR:		
Agricultural Tractor	$ 12.69	
Asphalt Distributor	$ 15.55	
Asphalt Paving Machine	$ 14.36	
Boom Truck	$ 18.36	
Broom or Sweeper	$ 11.04	
Concrete Pavement Finishing Machine	$ 15.48	
Crane, Hydraulic 80 tons or less	$ 18.36	
Crane, Lattice Boom 80 tons or less	$ 15.87	
Crane, Lattice Boom over 80 tons	$ 19.38	
Crawler Tractor	$ 15.67	
Directional Drilling		

Locator.....$ 11.67
Directional Drilling
Operator.....$ 17.24
Excavator 50,000 lbs or
Less.....$ 12.88
Excavator over 50,000 lbs...$ 17.71
Foundation Drill, Truck
Mounted.....$ 16.93
Front End Loader, 3 CY or
Less.....$ 13.04
Front End Loader, Over 3 CY.$ 13.21
Loader/Backhoe.....$ 14.12
Mechanic.....$ 17.10
Milling Machine.....$ 14.18
Motor Grader, Fine Grade....$ 18.51
Motor Grader, Rough.....$ 14.63
Pavement Marking Machine....$ 19.17
Reclaimer/Pulverizer.....$ 12.88
Roller, Asphalt.....$ 12.78
Roller, Other.....$ 10.50
Scraper.....$ 12.27
Spreader Box.....$ 14.04
Trenching Machine, Heavy....$ 18.48

Servicer.....$ 14.51

Steel Worker
Reinforcing.....$ 14.00
Structural.....$ 19.29

TRAFFIC SIGNALIZATION:
Traffic Signal Installation
Traffic Signal/Light Pole
Worker.....$ 16.00

TRUCK DRIVER
Lowboy-Float.....$ 15.66
Off Road Hauler.....$ 11.88
Single Axle.....$ 11.79
Single or Tandem Axle Dump
Truck.....$ 11.68
Tandem Axle Tractor w/Semi
Trailer.....$ 12.81

WELDER.....$ 15.97

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

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U.S. Department of Labor
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Wage and Hour Division
U.S. Department of Labor
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Washington, DC 20210

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200 Constitution Avenue, N.W.
Washington, DC 20210

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3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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END OF GENERAL DECISION
"

QUALIFICATIONS STATEMENT

THE INFORMATION SUPPLIED IN THIS DOCUMENT IS CONFIDENTIAL TO THE EXTENT PERMITTED BY LAWS AND REGULATIONS

1. SUBMITTED BY:

Official Name of Firm: _____

Address: _____

_____

_____

2. SUBMITTED TO: _____

3. SUBMITTED FOR: _____

Owner: _____

Project Name: _____

_____

_____

_____

TYPE OF WORK: _____

_____

_____

4. CONTRACTOR'S CONTACT INFORMATION

Contact Person: _____

Title: _____

Phone: _____

Email: _____

5. AFFILIATED COMPANIES:

Name: _____

Address: _____

_____

_____

6. TYPE OF ORGANIZATION:

☐ SOLE PROPRIETORSHIP

Name of Owner: _____

Doing Business As: _____

Date of Organization: _____

☐ PARTNERSHIP

Date of Organization: _____

Type of Partnership: _____

Name of General Partner(s): _____

_____

_____

☐ CORPORATION

State of Organization: _____

Date of Organization: _____

Executive Officers:

- President: _____

- Vice President(s): _____

_____

_____

- Treasurer: _____

- Secretary: _____

☐ LIMITED LIABILITY COMPANY

State of Organization: _____

Date of Organization: _____

Members: _____

_____

_____

_____

☐ JOINT VENTURE

Sate of Organization: _____

Date of Organization: _____

Form of Organization: _____

Joint Venture Managing Partner

- Name: _____

- Address: _____

_____

_____

Joint Venture Managing Partner

- Name: _____

- Address: _____

_____

Joint Venture Managing Partner

- Name: _____

- Address: _____

_____

7. LICENSING

Jurisdiction: _____

Type of License: _____

License Number: _____

Jurisdiction: _____

Type of License: _____

License Number: _____

8. CERTIFICATIONS CERTIFIED BY:

Disadvantage Business Enterprise: _____

Minority Business Enterprise: _____

Woman Owned Enterprise: _____

Small Business Enterprise: _____

Other (_____): _____

9. BONDING INFORMATION

Bonding Company: _____

Address: _____

_____

Bonding Agent: _____

Address: _____

_____

_____

Contact Name: _____

Phone: _____

Aggregate Bonding Capacity: _____

Available Bonding Capacity as of date of this submittal: _____

10. FINANCIAL INFORMATION

Financial Institution: _____

Address: _____

_____

Account Manager: _____

Phone: _____

INCLUDE AS AN ATTACHMENT AN AUDITED BALANCE SHEET FOR EACH OF THE LAST 3 YEARS

11. CONSTRUCTION EXPERIENCE:

Current Experience:

List on Schedule A all uncompleted projects currently under contract (If Joint Venture list each participant's projects separately).

Previous Experience:

List on Schedule B all projects completed within the last 5 Years (If Joint Venture list each participant's projects separately).

Has firm listed in Section 1 ever failed to complete a construction contract awarded to it?

☐ YES ☐ NO

If YES, attach as an Attachment details including Project Owner's contact information.

Has any Corporate Officer, Partner, Joint Venture participant or Proprietor ever failed to complete a construction contract awarded to them in their name or when acting as a principal of another entity?

☐ YES ☐ NO

If YES, attach as an Attachment details including Project Owner's contact information.

Are there any judgments, claims, disputes or litigation pending or outstanding involving the firm listed in Section 1 or any of its officers (or any of its partners if a partnership or any of the individual entities if a joint venture)?

☐ YES ☐ NO

If YES, attach as an Attachment details including Project Owner's contact information.

12. SAFETY PROGRAM:

Name of Contractor's Safety Officer:_____

Include the following as attachments:

Provide as an Attachment Contractor's (and Contractor's proposed Subcontractors and Suppliers furnishing or performing Work having a value in excess of 10 percent of the total amount of the Bid) OSHA No. 500- Log & Summary of Occupational Injuries & Illnesses for the past 5 years.

Provide as an Attachment Contractor's (and Contractor's proposed Subcontractors and Suppliers furnishing or performing Work having a value in excess of 10 percent of the total amount of the Bid) list of all OSHA Citations & Notifications of Penalty (monetary or other) received within the last 5 years (indicate disposition as applicable) - IF NONE SO STATE.

Provide as an Attachment Contractor's (and Contractor's proposed Subcontractors and Suppliers furnishing or performing Work having a value in excess of 10 percent of the total amount of the Bid) list of all safety citations or violations under any state all received within the last 5 years (indicate disposition as applicable) - IF NONE SO STATE.

Provide the following for the firm listed in Section V (and for each proposed Subcontractor furnishing or performing Work having a value in excess of 10 percent of the total amount of the Bid) the following (attach additional sheets as necessary):

Workers' compensation Experience Modification Rate (EMR) for the last 5 years:

YEAR	_____	EMR	_____
YEAR	_____	EMR	_____
YEAR	_____	EMR	_____
YEAR	_____	EMR	_____
YEAR	_____	EMR	_____

Total Recordable Frequency Rate (TRFR) for the last 5 years:

YEAR	_____	TRFR	_____
YEAR	_____	TRFR	_____
YEAR	_____	TRFR	_____
YEAR	_____	TRFR	_____
YEAR	_____	TRFR	_____

Total number of man-hours worked for the last 5 Years:

YEAR	_____	TOTAL NUMBER OF MAN-HOURS	_____
YEAR	_____	TOTAL NUMBER OF MAN-HOURS	_____
YEAR	_____	TOTAL NUMBER OF MAN-HOURS	_____
YEAR	_____	TOTAL NUMBER OF MAN-HOURS	_____
YEAR	_____	TOTAL NUMBER OF MAN-HOURS	_____

Provide Contractor's (and Contractor's proposed Subcontractors and Suppliers furnishing or performing Work having a value in excess of 10 percent of the total amount of the Bid) Days Away From Work, Days of Restricted Work Activity or Job Transfer (DART) incidence rate for the particular industry or type of Work to be performed by Contractor and each of Contractor's proposed Subcontractors and Suppliers) for the last 5 years:

YEAR	_____	DART	_____
YEAR	_____	DART	_____
YEAR	_____	DART	_____
YEAR	_____	DART	_____
YEAR	_____	DART	_____

13. EQUIPMENT:

MAJOR EQUIPMENT:

List on Schedule C all pieces of major equipment available for use on Owner's Project.

I HEREBY CERTIFY THAT THE INFORMATION SUBMITTED HEREWITH, INCLUDING ANY ATTACHMENTS, IS TRUE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

NAME OF ORGANIZATION: _____

BY: _____

TITLE: _____

DATED: _____

NOTARY ATTEST:

SUBSCRIBED AND SWORN TO BEFORE ME

THIS _____ DAY OF _____, 20___

NOTARY PUBLIC - STATE OF _____

MY COMMISSION EXPIRES:_____

REQUIRED ATTACHMENTS

1. Schedule A (Current Experience).
2. Schedule B (Previous Experience).
3. Schedule C (Major Equipment).
4. Audited balance sheet for each of the last 3 years for firm named in Section 1.
5. Evidence of authority for individuals listed in Section 7 to bind organization to an agreement.
6. Resumes of officers and key individuals (including Safety Officer) of firm named in Section 1.
7. Required safety program submittals listed in Section 13.
8. Additional items as pertinent.

SCHEDULE A

CURRENT EXPERIENCE

Project Name	Owner's Contact Person	Design Engineer	Contract Date	Type of Work	Status	Cost of Work
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				

SCHEDULE B

PREVIOUS EXPERIENCE (Include ALL Projects Completed within last 5 years)

Project Name	Owner's Contact Person	Design Engineer	Contract Date	Type of Work	Status	Cost of Work
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				

SCHEDULE B

PREVIOUS EXPERIENCE (Include ALL Projects Completed within last 5 years)

Project Name	Owner's Contact Person	Design Engineer	Contract Date	Type of Work	Status	Cost of Work
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				

SCHEDULE C - LIST OF MAJOR EQUIPMENT AVAILABLE

ITEM	PURCHASE DATE	CONDITION	ACQUIRED VALUE

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

This Agreement is dated as of _____ by and between The City of Boerne ("Owner") and _____. ("Contractor").

Owner and Contractor , in consideration of the mutual covenants hereinafter set forth, 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:

ARTICLE 2 – THE PROJECT

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

AMMANN ROAD GBRA WATER MAIN EXTENSION

ARTICLE 3 – ENGINEER

3.01 The part of the Project that pertains to the Work has been designed by KIMLEY-HORN, 10101 REUNION PLACE, STE. 400, SAN ANTONIO, TEXAS 78216, AND (210) 541-9166.

3.02 The Owner has retained KIMLEY-HORN ("Engineer") to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 – CONTRACT TIMES

4.01 *Time of the Essence*

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

4.02 *Contract Times: Days*

A. Contractor hereby agrees to begin Work within 7 calendar days after written notice to commence Work has been given by Engineer.

B. The Base Bid (or Alternate Bid) Work will be substantially completed within _240_ calendar days after written notice to commence Work has been given by Engineer, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within _270_ calendar days after written notice to commence Work has been given by Engineer.

4.03 *Liquidated Damages*

A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in

accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in ascertaining and 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. Contractor shall pay Owner $250.00 for each day that expires after the time specified in the above paragraph for completion and readiness for final payment until the Work is completed and ready for final payment.
2. Owner and Contractor agree that such amount is a reasonable forecast of the damages Owner will sustain per day that the work remains uncompleted. Owner shall have the option of deducting the amount of any liquidated damages from any monies that may be owed to Contractor or to recover such amount from the Contractor or its Sureties, at Contractor's expense.

ARTICLE 5 – CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to the Bid Proposal and any subsequent change orders thereto.

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 and Supplemental Conditions.

6.02 *Progress Payments; Retainage*

A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment as recommended by Engineer and in conformance with the procedures described in the General Conditions. 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 of each bid item completed).

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. _95_ percent of Work completed (with the balance being retainage).

b. _95_ percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).

6.03 *Final Payment*

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

ARTICLE 7 – CONTRACTOR'S REPRESENTATIONS

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

A. Contractor has examined and carefully studied the Contract Documents (including the Addenda, if any) and any data and reference items identified in the Contract Documents including "technical data".

B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, performance or furnishing of the Work.

C. Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Contractor has carefully studied all reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or adjacent to the Site that have been identified in the Supplementary Conditions.

1. Contractor acknowledges that such reports and drawings are not Contract Documents, are not a warranty of surface or subsurface conditions, and may not be complete for Contractor's purposes.

2. Contractor acknowledges that Owner and Engineer do not assume responsibility for the accuracy or completeness of the information and data relating to surface or subsurface conditions or with respect to Underground Facilities at or contiguous to the site or Contractor's interpretation of such information and data.

E. Contractor has obtained and carefully studied (or assumes responsibility for having done so) all such additional supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or adjacent to the site or otherwise which may affect cost, progress, performance, or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto.

F. Contractor has correlated the information known to Contractor, information and observations obtained from visits to the site, reports and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

G. Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance and furnishing of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

H. 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.

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

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

K. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

ARTICLE 8 – CONTRACT DOCUMENTS

8.01 *Contents*

A. The Contract Documents consist of the following:

1. This Agreement and Special Conditions of Agreement.
2. Exhibits to this Agreement.
3. Performance bond, Payment bond, and other bonds identified.
4. Advertisement to Bidders.
5. Instructions to Bidders.
6. Notice to Proceed.
7. General Conditions.
8. Supplementary Conditions.
9. Standard and Technical Specifications.
10. Construction Drawings.
11. Addenda.
12. Contractor's Bid.
13. Documentation submitted by Contractor prior to Notice of Award.
14. The following which may be delivered or issued after the Effective Date of the Agreement and are not attached thereto: All Written Amendments and other documents amending, modifying or supplementing the Contract Documents pursuant to paragraphs 3.5 and 3.6 of the General Conditions

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

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

ARTICLE 9 – INDEMNITY PROVISIONS

9.01 THE GENERAL, SPECIAL, AND SUPPLEMENTARY CONDITIONS ATTACHED TO THIS AGREEMENT CONTAIN PROVISIONS THAT MAY RELIEVE ONE PARTY FOR RESPONSIBILITY IT WOULD OTHERWISE HAVE UNDER THE LAW FOR DAMAGES OR OTHER LIABILITY ARISING OUT OF THE WORK.

9.02 EACH OF THE PARTIES HERETO SPECIFICALLY AGREES THAT IT HAS A DUTY TO READ THIS AGREEMENT, THE GENERAL, SPECIAL, AND SUPPLEMENTARY CONDITIONS, AND ALL OTHER ATTACHMENTS TO THIS AGREEMENT AND AGREES THAT IT IS CHARGED WITH NOTICE AND KNOWLEDGE OF THE TERMS OF THIS AGREEMENT AND ALL ATTACHMENTS HERETO; THAT IT HAS IN FACT READ THIS AGREEMENT AND ALL ATTACHMENTS HERETO AND IS FULLY INFORMED AND HAS FULL NOTICE AND KNOWLEDGE OF THE TERMS, CONDITIONS AND EFFECTS OF THIS AGREEMENT; THAT IT HAS HAD THE OPPORTUNITY TO BE REPRESENTED BY INDEPENDENT LEGAL COUNSEL OF ITS CHOICE PRECEDING ITS EXECUTION OF THIS AGREEMENT AND HAS RECEIVED OR VOLUNTARILY CHOSEN NOT TO RECEIVE THE

ADVICE OF ITS ATTORNEY IN ENTERING INTO THIS AGREEMENT; AND THAT IT RECOGNIZES THAT CERTAIN TERMS OF THIS AGREEMENT AND ALL ATTACHMENTS HERETO RESULT IN ONE PARTY ASSUMING THE LIABILITY INHERENT IN SOME ASPECTS OF THE TRANSACTION AND RELIEVING THE OTHER PARTY OF ITS RESPONSIBILITY FOR SUCH LIABILITY. EACH PARTY HERETO AGREES AND COVENANTS THAT IT WILL NOT CONTEST THE VALIDITY OR ENFORCEMENT OF ANY EXCULPATORY PROVISION OF THIS AGREEMENT, THE GENERAL, SPECIAL, AND SUPPLEMENTARY CONDITIONS, OR ANY OTHER ATTACHMENTS TO THIS AGREEMENT ON THE BASIS THAT THE PARTY HAD NO NOTICE OR KNOWLEDGE OF SUCH PROVISION OR THAT THE PROVISION IS NOT "CONSPICUOUS".

ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

A. Terms used in this Agreement which are defined in Article 1 of the General Conditions will have the meanings stated in the General Conditions and the Supplementary Conditions.

10.02 *Assignment of Contract*

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

10.03 *Successors and Assigns*

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

10.04 *Severability*

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

10.05 *Contractor's Certifications*

A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing 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.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement in duplicate. One counterpart each has been delivered to OWNER, CONTRACTOR, and ENGINEER. All portions of the Contract Documents have been signed, initialed or identified by OWNER and CONTRACTOR or identified by ENGINEER on their behalf.

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

OWNER:	CONTRACTOR:
CITY OF BOERNE	
By:	By:
Title:	Title:
	(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)
Attest:	Attest:
Title:	Title:
Address for giving notices:	Address for giving notices:
	License No.: *(where applicable)*

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

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

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

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

3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

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

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

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

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

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

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

10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer

has declined to address. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. ("CERCLA"); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5101 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. ("RCRA"); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

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

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

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

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

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

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

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

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

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

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

22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.

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

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

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

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

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

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

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

30. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.

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

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

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

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

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

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

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

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

40. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.

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

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

44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.

45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

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

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

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

1.02 *Terminology*

A. The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives*:

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

C. *Day*:

1. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective*:

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

a. does not conform to the Contract Documents; or

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

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

E. *Furnish, Install, Perform, Provide*:

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

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

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

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

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

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. *Bonds*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Contractor's Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.

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

2.02 *Copies of Documents*

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

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

2.03 *Before Starting Construction*

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

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

2. a preliminary Schedule of Submittals; and

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

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

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

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

2.05 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

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

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

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

2.06 *Electronic Transmittals*

A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.

B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.

C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or

computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

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

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

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

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

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

3.02 *Reference Standards*

A. Standards Specifications, Codes, Laws and Regulations

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

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

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*:

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

error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

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

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

B. *Resolving Discrepancies*:

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:

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

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

3.04 *Requirements of the Contract Documents*

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

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

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

3.05 *Reuse of Documents*

A. Contractor and its Subcontractors and Suppliers shall not:

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

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

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

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

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

4.02 *Starting the Work*

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

4.03 *Reference Points*

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

4.04 *Progress Schedule*

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

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

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

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

4.05 *Delays in Contractor's Progress*

A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

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

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

1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;

2. abnormal weather conditions;

3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and

4. acts of war or terrorism.

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

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

F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.

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

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

5.01 *Availability of Lands*

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

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

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

5.02 *Use of Site and Other Areas*

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

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

2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part

by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

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

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

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

5.03 *Subsurface and Physical Conditions*

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

1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;

2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and

3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

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

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

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

5.04 *Differing Subsurface or Physical Conditions*

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

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

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

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

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

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

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

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

D. *Possible Price and Times Adjustments*:

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

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

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

c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

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

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

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

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

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

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

5.05 *Underground Facilities*

A. *Contractor's Responsibilities*: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and

2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:

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

b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;

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

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

B. *Notice by Contractor*: If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after

becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

C. *Engineer's Review*: Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

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

E. *Possible Price and Times Adjustments*:

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

    a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;

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

    c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and

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

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

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

5.06 *Hazardous Environmental Conditions at Site*

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

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

2. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

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

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

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

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

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

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

F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.

G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.

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

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

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

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

ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

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

B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

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

D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.

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

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

6.02 *Insurance—General Provisions*

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

B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.

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

maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

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

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

G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.

H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.

I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.

J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

A. *Workers' Compensation*: Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.

2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).

3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).

4. Foreign voluntary worker compensation (if applicable).

B. *Commercial General Liability—Claims Covered*: Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:

1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.

2. claims for damages insured by reasonably available personal injury liability coverage.

3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.

C. *Commercial General Liability—Form and Content*: Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:

1. Products and completed operations coverage:

a. Such insurance shall be maintained for three years after final payment.

b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.

2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.

3. Broad form property damage coverage.

4. Severability of interest.

5. Underground, explosion, and collapse coverage.

6. Personal injury coverage.

7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.

8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.

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

E. *Umbrella or excess liability*: Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.

F. *Contractor's pollution liability insurance*: Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result

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

G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.

H. *Contractor's professional liability insurance*: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.

I. *General provisions*: The policies of insurance required by this Paragraph 6.03 shall:

1. include at least the specific coverages provided in this Article.

2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.

3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.

4. remain in effect at least until final payment (and longer if expressly required in this Article) and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract Documents.

5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.

J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

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

B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

6.05 *Property Insurance*

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

1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."

2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.

3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.

4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).

5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).

6. extend to cover damage or loss to insured property while in transit.

7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.

8. allow for the waiver of the insurer's subrogation rights, as set forth below.

9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.

10. not include a co-insurance clause.

11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.

12. include performance/hot testing and start-up.

13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.

B. *Notice of Cancellation or Change*: All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.

C. *Deductibles*: The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.

D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.

E. *Additional Insurance*: If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.

F. *Insurance of Other Property*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.

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

6.07 *Receipt and Application of Property Insurance Proceeds*

A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the

policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.

C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.

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

7.02 *Labor; Working Hours*

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

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

7.03 *Services, Materials, and Equipment*

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

B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and

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

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

7.04 *"Or Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment, or items from other proposed suppliers under the circumstances described below.

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

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

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

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

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

4) it is not objectionable to Owner.

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

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

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

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

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

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

E. *Treatment as a Substitution Request*: If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer considered the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 *Substitutes*

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

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

2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

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

a. shall certify that the proposed substitute item will:

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

2) be similar in substance to that specified, and

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

b. will state:

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

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

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

c. will identify:

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

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

d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.

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

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

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

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

F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.

B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.

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

D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.

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

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

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

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

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

J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.

K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.

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

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

N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.

O. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor

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

7.07 *Patent Fees and Royalties*

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

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

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

7.08 *Permits*

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

7.09 *Taxes*

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

7.10 *Laws and Regulations*

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

B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

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

7.11 *Record Documents*

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

7.12 *Safety and Protection*

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

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

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

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

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.

C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.

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

E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

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

7.13 *Safety Representative*

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

7.14 *Hazard Communication Programs*

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

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

7.15 *Emergencies*

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

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements*:

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

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

b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

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

d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

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

3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.

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

1. *Shop Drawings*:

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

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to

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

2. *Samples*:

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

   b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.

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

C. *Other Submittals*: Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.

D. *Engineer's Review*:

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

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

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

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

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

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

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

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

E. *Resubmittal Procedures*:

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

2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.

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

7.17 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.

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

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

2. normal wear and tear under normal usage.

C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;

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

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

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

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

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

7. any inspection, test, or approval by others; or

8. any correction of defective Work by Owner.

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

7.18 *Indemnification*

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

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

C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.

B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, and other submittals prepared by such professional. Shop

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

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.

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

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 *Other Work*

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

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

C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

8.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:

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

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

3. the extent of such authority and responsibilities.

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

8.03 *Legal Relationships*

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

B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.

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

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

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

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

9.03 *Furnish Data*

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

9.04 *Pay When Due*

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

9.05 *Lands and Easements; Reports, Tests, and Drawings*

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

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

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

9.06 *Insurance*

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

9.07 *Change Orders*

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

9.08 *Inspections, Tests, and Approvals*

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

9.09 *Limitations on Owner's Responsibilities*

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

9.10 *Undisclosed Hazardous Environmental Condition*

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

9.11 *Evidence of Financial Arrangements*

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

9.12 *Safety Programs*

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

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

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

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

10.02 *Visits to Site*

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

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during

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

10.03 *Project Representative*

A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

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

10.05 *Shop Drawings, Change Orders and Payments*

A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.

B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.

C. Engineer's authority as to Change Orders is set forth in Article 11.

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

10.06 *Determinations for Unit Price Work*

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

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

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

10.08 *Limitations on Engineer's Authority and Responsibilities*

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

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

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

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

E. The limitations upon authority and responsibility set forth in this Paragraph 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *Compliance with Safety Program*

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

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

11.01 *Amending and Supplementing Contract Documents*

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

1. *Change Orders*:

a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.

b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.

2. *Work Change Directives*: A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an

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

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

11.02 *Owner-Authorized Changes in the Work*

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

11.03 *Unauthorized Changes in the Work*

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

11.04 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.

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

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

2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on

the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).

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

1. a mutually acceptable fixed fee; or

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

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

b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.04.C.2.a and 11.04.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;

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

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.

B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

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

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

1. *Procedures*: Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.

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

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

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

11.07 *Execution of Change Orders*

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

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

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

3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and

4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.

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

11.08 *Notification to Surety*

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

ARTICLE 12 – CLAIMS

12.01 *Claims*

A. *Claims Process*: The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:

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

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

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

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

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

D. *Mediation*:

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

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

submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.

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

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

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

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

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

13.01 *Cost of the Work*

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

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

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

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

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable

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

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

    a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

    b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

    c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

    d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.

    e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

    f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes

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

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

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

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, 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. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*: When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.

E. *Documentation*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

13.02 *Allowances*

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances*: Contractor agrees that:

1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

13.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of the following paragraph.

E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;

2. there is no corresponding adjustment with respect to any other item of Work; and

3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

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

14.01 *Access to Work*

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

14.02 *Tests, Inspections, and Approvals*

A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.

B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:

1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;

2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;

3. by manufacturers of equipment furnished under the Contract Documents;

4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and

5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

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

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

F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to

cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

A. *Contractor's Obligation*: It is Contractor's obligation to assure that the Work is not defective.

B. *Engineer's Authority*: Engineer has the authority to determine whether Work is defective, and to reject defective Work.

C. *Notice of Defects*: Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.

D. *Correction, or Removal and Replacement*: Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.

E. *Preservation of Warranties*: When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

F. *Costs and Damages*: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

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

14.05 *Uncovering Work*

A. Engineer has the authority to require 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, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

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

14.07 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.

C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will

include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

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

15.01 *Progress Payments*

A. *Basis for Progress Payments*: The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.

B. *Applications for Payments*:

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. *Review of Applications*:

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and

c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or

b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

a. to supervise, direct, or control the Work, or

b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or

e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.

6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:

a. the Work is defective, requiring correction or replacement;

b. the Contract Price has been reduced by Change Orders;

c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

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

D. *Payment Becomes Due*:

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

E. *Reductions in Payment by Owner*:

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:

a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;

c. Contractor has failed to provide and maintain required bonds or insurance;

d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;

e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

f. the Work is defective, requiring correction or replacement;

g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

h. the Contract Price has been reduced by Change Orders;

i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;

j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;

k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

l. there are other items entitling Owner to a set off against the amount recommended.

2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount

remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

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

15.02 *Contractor's Warranty of Title*

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

15.03 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which shall fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

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

15.04 *Partial Use or Occupancy*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.

2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.05 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

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

15.06 *Final Payment*

A. *Application for Payment*:

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of

inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

   a. all documentation called for in the Contract Documents;

   b. consent of the surety, if any, to final payment;

   c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

   d. a list of all disputes that Contractor believes are unsettled; and

   e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Application and Acceptance*:

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Completion of Work*: The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.

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

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

15.07 *Waiver of Claims*

A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.

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

15.08 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. correct the defective repairs to the Site or such other adjacent areas;

2. correct such defective Work;

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

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

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

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

16.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);

2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;

3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or

4. Contractor's repeated disregard of the authority of Owner or Engineer.

B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:

1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and

2. enforce the rights available to Owner under any applicable performance bond.

C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.

D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses,

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

F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.

G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and

3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.

B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for

expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

A. *Disputes Subject to Final Resolution*: The following disputed matters are subject to final resolution under the provisions of this Article:

1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and

2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.

B. *Final Resolution of Disputes*: For any dispute subject to resolution under this Article, Owner or Contractor may:

1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or

2. agree with the other party to submit the dispute to another dispute resolution process; or

3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

18.02 *Computation of Times*

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

18.03 *Cumulative Remedies*

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

18.04 *Limitation of Damages*

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

18.05 *No Waiver*

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

18.06 *Survival of Obligations*

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

18.07 *Controlling Law*

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

18.08 *Headings*

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

I. SUPPLEMENTARY CONDITIONS

A. *Caption and Introductory Statements*

Supplementary Conditions

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

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

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

ARTICLE 2 – PRELIMINARY MATTERS

SC-2.01 Delivery of Bonds and Evidence of Insurance

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

B. Evidence of Contractor's Insurance: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner copies of the policies of insurance (including all endorsements, and identification of applicable self-insured retentions and deductibles) required to be provided by Contractor in Article 6. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

C. Not Used

SC-2.02 Copies of Documents

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

Owner shall furnish to Contractor 2 copies of the Contract Documents (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF).

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

SC-3.01 Intent

SC-3.01 Add the following new paragraphs immediately after Paragraph 3.01.E:

F. The Specifications may vary in form, format and style. Some specification sections are written in varying degrees of streamlined or declarative style and some sections may be relatively narrative by comparison. Omissions of such words and phrases as "the Contractor shall," "in conformity with," "as shown," or "as specified" are intentional in streamlined sections. Omitted words and phrases shall be supplied

by inference. Similar types of provisions may appear in various parts of a section or articles within a part depending on the format of the section. The Contractor shall not take advantage of any variation of form, format or style in making claims for extra Work.

G. The cross referencing of specification sections under the subparagraph heading "Related Sections include but are not necessarily limited to:" and elsewhere within each specification section is provided as an aid and convenience to the Contractor. The Contractor shall not rely on the cross referencing provided and shall be responsible to coordinate the entire Work under the Contract Documents and provide a complete Project whether or not the cross referencing is provided in each section or whether or not the cross referencing is complete.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

SC-4.05 Delays in Contractor's Progress

SC 4.05 Amend the first sentence of Paragraph 4.05.G to read as follows:

Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 10 days of the commencement of the delaying, disrupting, or interfering event.

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

SC-5.01 Availability of Lands

SC5.01 Amend paragraph 5.01.C to add the following sentence: "Contractor to provide Owner with written copy of any agreements with landowners regarding storage of materials and equipment."

SC-5.02 Use of Site and Other Areas

SC5.02 Delete Paragraphs 5.02.A.1 and 5.02.A.2 in their entirety and insert the following in their place:

A. Limitation on Use of Site and Other Areas:

1. CONTRACTOR SHALL CONFINE CONSTRUCTION EQUIPMENT, TEMPORARY CONSTRUCTION FACILITIES, THE STORAGE OF MATERIALS AND EQUIPMENT, AND THE OPERATIONS OF WORKERS TO THE SITE, ADJACENT AREAS THAT CONTRACTOR HAS ARRANGED TO USE THROUGH CONSTRUCTION EASEMENTS OR OTHERWISE, AND OTHER ADJACENT AREAS PERMITTED BY LAWS AND REGULATIONS, AND SHALL NOT UNREASONABLY ENCUMBER THE SITE AND SUCH OTHER ADJACENT AREAS WITH CONSTRUCTION EQUIPMENT OR OTHER MATERIALS OR EQUIPMENT. CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR (A) DAMAGE TO THE SITE; (B) DAMAGE TO ANY SUCH OTHER ADJACENT AREAS USED FOR CONTRACTOR'S OPERATIONS; (C) DAMAGE TO ANY OTHER ADJACENT LAND OR AREAS; AND (D) FOR INJURIES AND LOSSES SUSTAINED BY THE OWNERS OR OCCUPANTS OF ANY SUCH LAND OR AREAS; PROVIDED THAT SUCH DAMAGE OR INJURIES RESULT FROM THE PERFORMANCE OF THE WORK OR FROM OTHER ACTIONS OR CONDUCT OF THE CONTRACTOR OR THOSE FOR WHICH CONTRACTOR IS RESPONSIBLE.

2. IF A DAMAGE OR INJURY CLAIM IS MADE BY THE OWNER OR OCCUPANT OF ANY SUCH LAND OR AREA BECAUSE OF THE PERFORMANCE OF THE WORK, OR BECAUSE OF OTHER ACTIONS OR CONDUCT OF THE CONTRACTOR OR THOSE FOR WHICH CONTRACTOR IS RESPONSIBLE, CONTRACTOR SHALL (A) TAKE IMMEDIATE CORRECTIVE OR REMEDIAL ACTION AS REQUIRED BY PARAGRAPH 7.12, OR OTHERWISE; (B) PROMPTLY ATTEMPT TO SETTLE THE CLAIM AS TO ALL PARTIES THROUGH NEGOTIATIONS WITH SUCH OWNER OR OCCUPANT, OR OTHERWISE RESOLVE THE CLAIM BY ARBITRATION OR OTHER DISPUTE RESOLUTION PROCEEDING, OR AT LAW; AND (C) TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, INDEMNIFY AND HOLD HARMLESS OWNER AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS AND SUBCONTRACTORS OF EACH AND ANY OF THEM FROM AND AGAINST ANY SUCH CLAIM, AND AGAINST ALL COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO ANY CLAIM OR ACTION, LEGAL OR EQUITABLE, BROUGHT BY ANY SUCH OWNER OR OCCUPANT AGAINST OWNER, ENGINEER, OR ANY OTHER PARTY INDEMNIFIED HEREUNDER TO THE EXTENT CAUSED DIRECTLY OR INDIRECTLY, IN WHOLE OR IN PART BY, OR BASED UPON, CONTRACTOR'S PERFORMANCE OF THE WORK, OR BECAUSE OF OTHER ACTIONS OR CONDUCT OF THE CONTRACTOR OR THOSE FOR WHICH CONTRACTOR IS RESPONSIBLE.

SC-5.03 Subsurface and Physical Conditions

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

C. The following reports of explorations and tests of subsurface conditions at or adjacent to the Site are known to Owner:

1. SUBSURFACE EXPLORATION, LABORATORY TESTING PROGRAM, AND FOUNDATION AND PAVEMENT RECOMMENDATIONS FOR THE PROPOSED AMMANN ROAD WATER TANK AND PUMP STATION BOERNE, TX

D. Contractor may examine copies of reports and drawings identified in SC 5.03.C by downloading them from CIVCAST.

SC-5.06 Hazardous Environmental Conditions

SC 5.06 Delete Paragraphs, 506.I and 506.J in their entirety and insert the following:

I. Not Used.

J. TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS, AND SUBCONTRACTORS OF EACH AND ANY OF THEM FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO THE FAILURE TO CONTROL, CONTAIN, OR REMOVE A CONSTITUENT OF

CONCERN BROUGHT TO THE SITE BY CONTRACTOR OR BY ANYONE FOR WHOM CONTRACTOR IS RESPONSIBLE, OR TO A HAZARDOUS ENVIRONMENTAL CONDITION CREATED BY CONTRACTOR OR BY ANYONE FOR WHOM CONTRACTOR IS RESPONSIBLE. NOTHING IN THIS PARAGRAPH 5.06.J SHALL OBLIGATE CONTRACTOR TO INDEMNIFY ANY INDIVIDUAL OR ENTITY FROM AND AGAINST THE CONSEQUENCES OF THAT INDIVIDUAL'S OR ENTITY'S OWN NEGLIGENCE.

ARTICLE 6 – BONDS AND INSURANCE

SC-6.02 Insurance—General Provisions

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

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

SC-6.02 Delete Paragraphs 602.D. in its entirety and insert the following:

D. Not Used

SC-6.03 Contractor's Liability Insurance

SC 6.03 Amend the first sentence of Paragraph 6.03I.3. to read as follows:

Contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused at least 30 days prior written notice has been given to Contractor.

SC 6.03 Add the following new paragraph immediately after Paragraph 6.03.I.J:

a. Definitions:

Certificate of coverage ("certificate") – A copy of a certificate of insurance, a certificate of authority to self-insure by the commission, or a coverage agreement (TWCC-81, TWCC-92, TWCC-83, or TWCC-84), showing statutory workers' compensation insurance coverage for the person's or entity's employees providing services on a project, for the duration of the project.

Duration of the project – includes the time from the beginning of the work on the project until the contractor's/person's work on the project has been completed and accepted by the governmental entity.

Persons providing services on the project -("subcontractor" in Texas Labor Code, Section 406.096)- includes all persons or entities performing all or part of the services the contractor has undertaken to perform on the project, regardless of whether that person has contracted directly with the contractor and regardless of whether that person has employees. This includes, without limitation, independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity which furnishes person to provide services on the project. "Services" include, without limitation, providing, hauling, or

delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include activities unrelated to the project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

b. The contractor shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirement of Texas Labor Code, Section 401.011 944) for all employees of the contractor providing services on the project, for the duration of the project.

c. The contractor must provide a certificate of coverage to the government entity prior to being awarded the contract.

d. If the coverage period shown on the contractor's current certificate of coverage ends during the duration of the project, the contractor must, within 30 days prior to the end of the coverage period, file a new certificate of coverage with the governmental entity showing that coverage has been extended.

e. The contractor shall obtain from each person providing services on a project, and provide to the governmental entity:

i. a certificate of coverage, prior to that person beginning work on the project, so the governmental entity will have on file certificates of coverage showing coverage for all persons providing services on the project; and

ii. no later than seven days after receipt by the contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project.

f. The contractor shall retain all required certificates of coverage for the duration of the project and for one year thereafter.

g. The contractor shall notify the governmental entity in writing by certified mail or personal delivery, within 10 days after the contractor know or should have known, of any change that materially affects the provision of coverage of any person providing services on the project.

h. The contractor shall post on each project site a notice, in the text, form and manner prescribed by the Texas Worker's Compensation Commission, informing all persons providing services on the project that are required to be covered, and stating how a person may verify coverage and report lack of coverage.

i. The contractor shall contractually require each person with whom it contracts to provide services on a project, to:

i. provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011 (44) for all of its employees providing services on the project, for the duration of the project;

ii. provide to the contractor, prior to that person beginning work on the project, a certificate of coverage showing that coverage is being provided for all employees of the person providing services on the project, for the duration of the project;

iii. provide the contractor, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project;

iv. obtain from each other person with whom it contracts, and provide to the contractor:

v. retain all required certificates of coverage on file for the duration of the project and for one year thereafter; notify the governmental entity in writing by certified mail or personal delivery, within three (3) days after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project; and

vi. contractually require each person with whom it contracts, to perform as required by paragraphs (a) – (g), with the certificate of coverage to be provided to the person for whom they are providing services.

j. By signing this contract or providing or causing to be provided a certificate of coverage, the contractor is representing to the governmental entity that all employees of the contractor who will provide services on the project will be covered by workers compensation coverage for the duration of the project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insuring, with the commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions.

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

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

State:		Statutory
Federal, if applicable (e.g., Longshoreman's):		Statutory
Jones Act coverage, if applicable:		
Bodily injury by accident, each accident	$	_____
Bodily injury by disease, aggregate	$	_____
Employer's Liability:		
Bodily injury, each accident	$	_____
Bodily injury by disease, each employee	$	_____
Bodily injury/disease aggregate	$	_____
For work performed in monopolistic states, stop-gap liability coverage shall be endorsed to either the worker's compensation or commercial general liability policy with a minimum limit of:	$	_____
Foreign voluntary worker compensation		Statutory

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

General Aggregate	$ 1,000,000
Products - Completed Operations Aggregate	$ 1,000,000
Personal and Advertising Injury	$ 1,000,000
Each Occurrence (Bodily Injury and Property Damage)	$ 500,000

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

Bodily Injury:	
Each person	$ 250,000
Each accident	$ 250,000
Property Damage:	
Each accident	$ 500,000
[or]	
Combined Single Limit of	$ 1,000,000

4. Excess or Umbrella Liability:

Per Occurrence	$ 500,000
General Aggregate	$ 1,000,000

5. Contractor's Pollution Liability:

Each Occurrence	$ N/A
General Aggregate	$ N/A

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

6. Additional Insureds: In addition to Owner and Engineer, include as additional insureds the following: *[Here list by name (not category, role, or classification) other persons or entities to be included on the commercial general liability, automobile liability, umbrella or excess, and pollution liability policies as additional insureds.]*

7. Contractor's Professional Liability:

Each Claim	$ 500,000
Annual Aggregate	$ 1,000,000

SC-6.05 Property Insurance

SC-6.05A. Add the following to the list of requirements in Paragraph 6.05.A, as a numbered item:

14. be subject to a deductible amount of no more than $1,000 for direct physical loss in any one occurrence.

15. include for the benefit of Owner loss of profits and soft cost coverage including, without limitation, fixed expenses and debt service for a minimum of 12 months with a maximum deductible of 30 days, plus attorneys fees and engineering or other consultants' fees, if not otherwise covered;

16. include by express endorsement coverage of damage to Contractor's equipment.

SC-6.06 Waiver of Rights

SC6.06 Delete Paragraphs 6.06.A, 6.06.B and 6.06C in their entirety and insert the following in their place:

A. Not Used

B. Not Used

C. Not Used

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

SC-7.01 Supervision and Superintendence

SC-7.01.B. Amend Paragraph 7.01.B to add the following sentences: "The Contractor shall identify their representative at the Site that shall have authority to act on behalf of Contractor. All communications given to or received from this representative shall be binding on Contractor."

SC-7.01.C. Add the following new paragraph immediately after Paragraph 7.01.B:

Any superintendent or other personnel, who repeatedly fails to follow the Engineer's written or oral orders, directions, instructions, or determinations, shall be subject to removal from the project. Upon the written request of the Engineer, the Contractor shall immediately remove such superintendent or other personnel and name a replacement in writing. Noncompliance with the Engineer's request to remove and replace personnel at any level shall be grounds for terminating the Contract.

SC-7.02 Labor; Working Hours

SC-7.02.B. Add the following new subparagraphs immediately after Paragraph 7.02.B:

1. Regular working hours will be 7:00 AM to 9:00 PM, Monday through Friday; 8:00 AM to 9:00 PM on Saturday and 10:00 AM to 8:00 PM on Sunday. Work conducted outside of regular working hours will be allowed only if authorized by Owner in writing. Contractor to provide a minimum of seven (7) days' notice via written request for work outside of regular working hours for City Manager approval per City of Boerne Noise Ordinance. No work allowed on Holidays unless authorized by Owner in writing. Overnight work will be allowed for tie–ins if coordinated with and authorized by Owner in writing in advance.

2. Owner's legal holidays are New Year's Day, Martin Luther King Day, President's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Columbus Day, Veteran's Day, Thanksgiving, Day after Thanksgiving, Christmas Day, Day after Christmas.

SC-7.02.C. Add the following new paragraph immediately after Paragraph 7.02.B:

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

SC-7.02.C. Add the following new subparagraph immediately after Paragraph 7.02.C:

1. For purposes of administering the foregoing requirement, additional overtime costs are defined as hours worked outside of regular working hours.

SC-7.03 Service, Materials, and Equipment

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

1. Where the Work requires equipment be furnished, due to the lack of standardization of equipment as produced by the various manufacturers, it may become necessary to make minor modifications in the structures, buildings, piping, mechanical work, electrical work, accessories, controls, or other work, to accommodate the particular equipment offered. Contractor's bid price for any equipment offered shall include the cost of making any necessary changes subject to the approval of Engineer.

SC-7.07 Patent Fees and Royalties

SC 7.07 Delete Paragraphs 7.07.B and 7.07C in their entirety and insert the following in their place:

B. Not Used

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.

SC-7.09 Taxes

SC 7.09 Add a new paragraph immediately after Paragraph 7.09.A:

B. Owner is exempt from payment of sales and compensating use taxes of the State of Texas and of cities and counties thereof on all materials to be incorporated into the Work.

1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the Work.

2. Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work.

SC-7.10 Laws and Regulations

SC 7.10 DELETE PARAGRAPHS 7.10A, 7.10.B AND 7.10C IN THEIR ENTIRETY AND INSERT THE FOLLOWING IN THEIR PLACE:

A. CONTRACTOR SHALL GIVE ALL NOTICES REQUIRED BY AND SHALL COMPLY WITH ALL LAWS AND REGULATIONS APPLICABLE TO THE PERFORMANCE OF THE WORK. EXCEPT WHERE OTHERWISE EXPRESSLY REQUIRED BY APPLICABLE LAWS AND REGULATIONS, NEITHER OWNER NOR ENGINEER SHALL BE RESPONSIBLE FOR MONITORING CONTRACTOR'S COMPLIANCE WITH ANY LAWS OR REGULATIONS.

B. IF CONTRACTOR PERFORMS ANY WORK OR TAKES ANY OTHER ACTION KNOWING OR HAVING REASON TO KNOW THAT IT IS CONTRARY TO LAWS OR REGULATIONS, CONTRACTOR SHALL BEAR ALL RESULTING COSTS AND LOSSES, AND SHALL INDEMNIFY AND HOLD HARMLESS OWNER AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS, AND SUBCONTRACTORS OF EACH AND ANY OF THEM FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO SUCH WORK OR OTHER ACTION. IT SHALL NOT BE CONTRACTOR'S RESPONSIBILITY TO MAKE CERTAIN THAT THE WORK DESCRIBED IN THE CONTRACT DOCUMENTS IS IN ACCORDANCE WITH LAWS AND REGULATIONS, BUT THIS SHALL NOT RELIEVE CONTRACTOR OF CONTRACTOR'S OBLIGATIONS UNDER PARAGRAPH 3.03.

C. OWNER OR CONTRACTOR MAY GIVE NOTICE TO THE OTHER PARTY OF ANY CHANGES AFTER THE SUBMISSION OF CONTRACTOR'S BID (OR AFTER THE DATE

WHEN CONTRACTOR BECAME BOUND UNDER A NEGOTIATED CONTRACT) IN LAWS OR REGULATIONS HAVING AN EFFECT ON THE COST OR TIME OF PERFORMANCE OF THE WORK, INCLUDING BUT NOT LIMITED TO CHANGES IN LAWS OR REGULATIONS HAVING AN EFFECT ON PROCURING PERMITS AND ON SALES, USE, VALUE-ADDED, CONSUMPTION, AND OTHER SIMILAR TAXES. IF OWNER AND CONTRACTOR ARE UNABLE TO AGREE ON ENTITLEMENT TO OR ON THE AMOUNT OR EXTENT, IF ANY, OF ANY ADJUSTMENT IN CONTRACT PRICE OR CONTRACT TIMES RESULTING FROM SUCH CHANGES, THEN WITHIN 30 DAYS OF SUCH NOTICE CONTRACTOR MAY SUBMIT A CHANGE PROPOSAL, OR OWNER MAY INITIATE A CLAIM.

SC-7.18 Indemnification

SC 7.18 DELETE PARAGRAPHS 7.18A, 7.18.B AND 7.18C IN THEIR ENTIRETY AND INSERT THE FOLLOWING IN THEIR PLACE:

A. TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, AND IN ADDITION TO ANY OTHER OBLIGATIONS OF CONTRACTOR UNDER THE CONTRACT OR OTHERWISE, CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS AND SUBCONTRACTORS OF EACH AND ANY OF THEM FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO THE PERFORMANCE OF THE WORK, PROVIDED THAT ANY SUCH CLAIM, COST, LOSS, OR DAMAGE IS ATTRIBUTABLE TO BODILY INJURY, SICKNESS, DISEASE, OR DEATH, OR TO INJURY TO OR DESTRUCTION OF TANGIBLE PROPERTY (OTHER THAN THE WORK ITSELF), INCLUDING THE LOSS OF USE RESULTING THEREFROM BUT ONLY TO THE EXTENT CAUSED BY ANY ACT OR OMISSION OF CONTRACTOR, ANY SUBCONTRACTOR, ANY SUPPLIER, OR ANY INDIVIDUAL OR ENTITY DIRECTLY OR INDIRECTLY EMPLOYED BY ANY OF THEM TO PERFORM ANY OF THE WORK OR ANYONE FOR WHOSE ACTS ANY OF THEM MAY BE LIABLE.

B. IN ANY AND ALL CLAIMS AGAINST OWNER OR ENGINEER OR ANY OF THEIR OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS, OR SUBCONTRACTORS BY ANY EMPLOYEE (OR THE SURVIVOR OR PERSONAL REPRESENTATIVE OF SUCH EMPLOYEE) OF CONTRACTOR, ANY SUBCONTRACTOR, ANY SUPPLIER, OR ANY INDIVIDUAL OR ENTITY DIRECTLY OR INDIRECTLY EMPLOYED BY ANY OF THEM TO PERFORM ANY OF THE WORK, OR ANYONE FOR WHOSE ACTS ANY OF THEM MAY BE LIABLE, THE INDEMNIFICATION OBLIGATION UNDER PARAGRAPH 7.18.A SHALL NOT BE LIMITED IN ANY WAY BY ANY LIMITATION ON THE AMOUNT OR TYPE OF DAMAGES, COMPENSATION, OR BENEFITS PAYABLE BY OR FOR CONTRACTOR OR ANY SUCH SUBCONTRACTOR, SUPPLIER, OR OTHER INDIVIDUAL OR ENTITY UNDER WORKERS' COMPENSATION ACTS, DISABILITY BENEFIT ACTS, OR OTHER EMPLOYEE BENEFIT ACTS.

C. THE INDEMNIFICATION OBLIGATIONS OF CONTRACTOR UNDER PARAGRAPH 7.18.A SHALL NOT EXTEND TO THE LIABILITY OF ENGINEER AND ENGINEER'S

OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS AND SUBCONTRACTORS ARISING OUT OF:

1. THE PREPARATION OR APPROVAL OF, OR THE FAILURE TO PREPARE OR APPROVE MAPS, DRAWINGS, OPINIONS, REPORTS, SURVEYS, CHANGE ORDERS, DESIGNS, OR SPECIFICATIONS; OR

2. GIVING DIRECTIONS OR INSTRUCTIONS, OR FAILING TO GIVE THEM, IF THAT IS THE PRIMARY CAUSE OF THE INJURY OR DAMAGE.

ARTICLE 8 – OTHER WORK AT THE SITE

SC-8.03` Legal Relationships

SC-8.03 DELETE PARAGRAPHS 8.03.A, 8.03.B, 8.03.C AND 8.03D IN THEIR ENTIRETY AND INSERT THE FOLLOWING IN THEIR PLACE:

A. IF, IN THE COURSE OF PERFORMING OTHER WORK AT OR ADJACENT TO THE SITE FOR OWNER, THE OWNER'S EMPLOYEES, ANY OTHER CONTRACTOR WORKING FOR OWNER, OR ANY UTILITY OWNER FOR WHOM THE OWNER IS RESPONSIBLE CAUSES DAMAGE TO THE WORK OR TO THE PROPERTY OF CONTRACTOR OR ITS SUBCONTRACTORS, OR DELAYS, DISRUPTS, INTERFERES WITH, OR INCREASES THE SCOPE OR COST OF THE PERFORMANCE OF THE WORK, THROUGH ACTIONS OR INACTION, THEN CONTRACTOR SHALL BE ENTITLED TO AN EQUITABLE ADJUSTMENT IN THE CONTRACT PRICE OR THE CONTRACT TIMES, OR BOTH. CONTRACTOR MUST SUBMIT ANY CHANGE PROPOSAL SEEKING AN EQUITABLE ADJUSTMENT IN THE CONTRACT PRICE OR THE CONTRACT TIMES UNDER THIS PARAGRAPH WITHIN 30 DAYS OF THE DAMAGING, DELAYING,

DISRUPTING, OR INTERFERING EVENT. THE ENTITLEMENT TO, AND EXTENT OF, ANY SUCH EQUITABLE ADJUSTMENT SHALL TAKE INTO ACCOUNT INFORMATION (IF ANY) REGARDING SUCH OTHER WORK THAT WAS PROVIDED TO CONTRACTOR IN THE CONTRACT DOCUMENTS PRIOR TO THE SUBMITTAL OF THE BID OR THE FINAL NEGOTIATION OF THE TERMS OF THE CONTRACT. WHEN APPLICABLE, ANY SUCH EQUITABLE ADJUSTMENT IN CONTRACT PRICE SHALL BE CONDITIONED ON CONTRACTOR ASSIGNING TO OWNER ALL CONTRACTOR'S RIGHTS AGAINST SUCH OTHER CONTRACTOR OR UTILITY OWNER WITH RESPECT TO THE DAMAGE, DELAY, DISRUPTION, OR INTERFERENCE THAT IS THE SUBJECT OF THE ADJUSTMENT. CONTRACTOR'S ENTITLEMENT TO AN ADJUSTMENT OF THE CONTRACT TIMES IS CONDITIONED ON SUCH ADJUSTMENT BEING ESSENTIAL TO CONTRACTOR'S ABILITY TO COMPLETE THE WORK WITHIN THE CONTRACT TIMES.

B. CONTRACTOR SHALL TAKE REASONABLE AND CUSTOMARY MEASURES TO AVOID DAMAGING, DELAYING, DISRUPTING, OR INTERFERING WITH THE WORK OF OWNER, ANY OTHER CONTRACTOR, OR ANY UTILITY OWNER PERFORMING OTHER WORK AT OR ADJACENT TO THE SITE. IF CONTRACTOR FAILS TO TAKE SUCH MEASURES AND AS A RESULT DAMAGES, DELAYS, DISRUPTS, OR INTERFERES WITH THE WORK OF ANY SUCH OTHER CONTRACTOR OR UTILITY OWNER, THEN OWNER MAY IMPOSE A SET-OFF AGAINST PAYMENTS DUE TO CONTRACTOR, AND ASSIGN TO SUCH OTHER CONTRACTOR OR UTILITY OWNER THE OWNER'S CONTRACTUAL RIGHTS AGAINST CONTRACTOR WITH RESPECT TO THE BREACH OF THE OBLIGATIONS SET FORTH IN THIS PARAGRAPH.

C. WHEN OWNER IS PERFORMING OTHER WORK AT OR ADJACENT TO THE SITE WITH OWNER'S EMPLOYEES, CONTRACTOR SHALL BE LIABLE TO OWNER FOR DAMAGE TO SUCH OTHER WORK, AND FOR THE REASONABLE DIRECT DELAY, DISRUPTION, AND INTERFERENCE COSTS INCURRED BY OWNER AS A RESULT OF CONTRACTOR'S FAILURE TO TAKE REASONABLE AND CUSTOMARY MEASURES WITH RESPECT TO OWNER'S OTHER WORK. IN RESPONSE TO SUCH DAMAGE, DELAY, DISRUPTION, OR INTERFERENCE, OWNER MAY IMPOSE A SET-OFF AGAINST PAYMENTS DUE TO CONTRACTOR.

D. IF CONTRACTOR DAMAGES, DELAYS, DISRUPTS, OR INTERFERES WITH THE WORK OF ANY OTHER CONTRACTOR, OR ANY UTILITY OWNER PERFORMING OTHER WORK AT OR ADJACENT TO THE SITE, THROUGH CONTRACTOR'S FAILURE TO TAKE REASONABLE AND CUSTOMARY MEASURES TO AVOID SUCH IMPACTS, OR IF ANY CLAIM ARISING OUT OF CONTRACTOR'S ACTIONS, INACTIONS, OR NEGLIGENCE IN PERFORMANCE OF THE WORK AT OR ADJACENT TO THE SITE IS MADE BY ANY SUCH OTHER CONTRACTOR OR UTILITY OWNER AGAINST CONTRACTOR, OWNER, OR ENGINEER, THEN CONTRACTOR SHALL (1) PROMPTLY ATTEMPT TO SETTLE THE CLAIM AS TO ALL PARTIES THROUGH NEGOTIATIONS WITH SUCH OTHER CONTRACTOR OR UTILITY OWNER, OR OTHERWISE RESOLVE THE CLAIM BY ARBITRATION OR OTHER DISPUTE RESOLUTION PROCEEDING OR AT LAW, AND (2) INDEMNIFY AND HOLD HARMLESS OWNER AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS AND SUBCONTRACTORS OF EACH AND ANY OF THEM FROM AND AGAINST ANY SUCH CLAIMS, AND AGAINST ALL COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO SUCH DAMAGE, DELAY, DISRUPTION, OR INTERFERENCE.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

SC-9.13 Owner's Site Representative

SC-9.13 Add the following new paragraph immediately after Paragraph 9.12 of the General Conditions:

SC-9.13 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.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

SC-10.03 Project Representative

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

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

SC-10.06 Determination for Unit Price Work

10.06.A Modify Paragraph GC-10.06.A by adding the following sentence at the end of the first sentence: "Contractor shall, at his own expense, provide help and other assistance as may be required for making measurements of Unit Price Work.

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

SC-13.01 Cost of the Work

SC 13.01.B.5.c Delete Paragraph 13.01.B.5.c in its entirety and insert the following in its place:

c. Construction Equipment and Machinery:

1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

2) Costs for equipment and machinery owned by Contractor will be paid at a rate shown for such equipment in the *RS Means*. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs. Costs will include the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, shall cease to accrue when the use thereof is no longer necessary for the changed Work. Equipment or machinery with a value of less than $1,000 will be considered small tools.

SC-13.03 Unit Price Work

SC-13.03.B. Amend Paragraph 13.03.B to add the following sentences: “Progress estimates serve only as basis for partial payments. The Engineer may revise progress estimates and/or quantities any time before final acceptance. If the Engineer deems it proper to do so, changes may be made in progress estimates and in the final estimate.”

SC-13.03.C. Amend Paragraph 13.03.C to add the following sentences: “Work described in the Contract Documents, or reasonably inferred as required for a functionally complete installation, but not identified in the listing of unit price items, shall be considered incidental to unit price work listed and the cost of incidental work included as a part of the unit price.”

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

SC-14.02 Tests, Inspections and Approvals

SC 14.02.B Amend Paragraph 14.02B to add the following sentences: “All retests, due to failure of the initial test, shall be paid by the CONTRACTOR”. Materials and Work which do not meet or

exceed those specified as determined by the testing laboratory shall be removed from the Work site and correct materials and Work installed at the CONTRACTOR's expense..

SC 14.02.D add the following Paragraph immediately following Paragraph 14.02.D.5:

6. All retests, due to failure of the initial test, shall be paid by the CONTRACTOR". Materials and Work which do not meet or exceed those specified as determined by the testing laboratory shall be removed from the Work site and correct materials and Work installed at the CONTRACTOR's expense..

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

SC-15.03 Substantial Completion

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

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

SC-15.07 Waiver of Claims

SC-15.07.B. Amend Paragraph 15.07.B to state "The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner and/or Engineer other than those pending matters that have been duly submitted or appealed under the provisions of Article 17."

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

SC-17.02 Attorneys' Fees

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

SC-17.02 Attorneys' Fees: For any matter subject to final resolution under this Article, the prevailing party shall be entitled to an award of its attorneys' fees incurred in the final resolution proceedings, in an equitable amount to be determined in the discretion of the court, arbitrator, arbitration panel, or other arbiter of the matter subject to final resolution, taking into account the parties' initial demand or defense positions in comparison with the final result.

ARTICLE 18 – MISCELLANEOUS

SC 18.01 Giving Notice

SC 18.01 Delete Paragraph 18.01.A. in its entirety and insert the following in its place:

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given:

1. if delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or

2. three (3) days after delivery by registered or certified mail, to the last business address known to the sender of the notice.

SC-18.09 Wage Rates

SC-18.09 Add the following new paragraph immediately after Paragraph 18.08.

SC-18.09 Wage Rates: Contractor to comply with the attached Prevailing Wage Rates for Heavy Construction Projects.

PERFORMANCE BOND

STATE OF _____

COUNTY OF _____

We, _____(Contractor name) ,
_____(address),
as Principal, and_____
(bond company name), as Surety, are held and firmly bound unto the City of Boerne, Texas, as Owner, in the penal sum of_____
_____dollars ($_____), for the payment of which the Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, by this bond:

The Principal has entered into a written Contract with the Owner dated _____for the _____ ("Project"), which is fully incorporated into this bond by reference.

The condition of this obligation is that if the Principal faithfully and promptly performs all work for the Project in accordance with the Contract Documents, and faithfully and promptly observes and performs all of its covenants, conditions, duties and obligations under the Contract Documents according to their true intent and meaning, then this obligation will be satisfied; otherwise it will remain in full force and effect.

If the Owner declares the Principal to be in default under the Contract, the Surety agrees to either 1) promptly remedy the default, or 2) faithfully and promptly perform and complete the Project in accordance with the Contract Documents.

The Surety, for value received, agrees that no modification, change order, extension of time, amendment or addition to the Contract, or to the plans, specifications, drawings or other Contract Documents, will in any way affect the Surety's obligation on this bond, and the Surety waives notice of any such modification, change order, extension of time, amendment or addition.

The Surety certifies that it is authorized and admitted to write surety bonds in Texas. If this bond exceeds $100,000.00 the surety certifies that it either 1) holds a certificate of authority from the United States Secretary of the Treasury to qualify as a surety on obligations permitted or required under federal law, or 2) has obtained qualified reinsurance for any liability in excess of $100,000.00 from a reinsurer that is authorized and admitted as a reinsurer in the State of Texas, and is the holder of a certificate of authority from the United States Secretary of the Treasury to qualify as a surety or reinsurer on obligations permitted or required under federal law. This bond is governed by Chapter 2253 of the Texas Government Code, and it is provided solely for the protection of the Owner.

This bond is filed with the Owner in Kendall County, Texas, and the Principal and Surety agree that mandatory venue for any legal action filed upon this bond is in the District Courts of Kendall County, Texas.

Executed and sealed by the Principal and Surety on_____.

_____	_____
Principal	Surety
By: _____	By:_____
Title:_____	Title:_____
Address:_____	Address:_____
_____	_____
_____	_____
	Telephone Number:_____
	Facsimile Number:_____
(SEAL)	(SEAL)

The name and address of the Resident Agent of Surety is:

_____

_____

THIS BOND MUST BE ISSUED AFTER EXECUTION OF OWNER-CONTRACTOR AGREEMENT BY BOTH PARTIES. ATTACH ORIGINAL POWER OF ATTORNEY FOR THE SURETY'S REPRESENTATIVE TO THIS BOND.

THE ADDRESS OF THE SURETY COMPANY TO WHICH ANY NOTICE OF CLAIM SHOULD BE SENT MAY BE OBTAINED FROM THE TEXAS DEPARTMENT OF INSURANCE BY CALLING 1-800-252-3439.

PAYMENT BOND

STATE OF TEXAS

COUNTY OF KENDALL

KNOW ALL PERSONS BY THESE PRESENTS:

That _____ , of the City of _____ , County of _____ , and State of Texas, as Principal, and _____ , authorized under the Laws of the State of Texas to act as surety on bonds for principals, are held and firmly bound unto City of Boerne ("Owner"), in the penal sum of _____ for the payment whereof, the said Principal and Surety bind themselves, and their respective officers, directors, shareholders, partners, heirs, administrators, executors, successors, and assigns, jointly and severally, by these presents:

WHEREAS, the Principal has entered into a certain written contract with the Owner, dated the _____ day of _____ , 20_____ , for construction of:

AMMANN ROAD GBRA WATER MAIN EXTENSION

which contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION IS SUCH, that if the said Principal shall pay all claimants supplying labor and material to him or a subcontractor in the prosecution of the work provided for in said contract, then, this obligation shall be void; otherwise to remain in full force and effect;

PROVIDED, HOWEVER, That this bond is executed pursuant to the provisions of Chapter 2253 of the Texas Government Code, as amended and all liabilities on this bond shall be determined in accordance with the provisions of said Statute to the same extent as if it were copied at length herein.

Surety, for value received, stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract, or to work performed thereunder, or the plans, specifications, or drawings, accompanying the same, shall in anyway affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract, or the work to be performed thereunder.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument the _____ day of _____ , 20_____.

Principal	Surety
Signature:	Signature:
By:	By:
Title:	Title:
Address:	Physical Address:
	Mailing Address:
	Telephone:
	Local Recording Agent Personal Identification Number:

The name and address of the Resident Agent of Surety is

GENERAL REQUIREMENTS

SCOPE OF WORK

The project consists of the following elements of work in connection with this development.

BASE BID:

1. **Mobilization**
2. **Installation of a PVC potable water main and appurtenances**
3. **Construction of potable water metering station**
4. **Construction of associated site improvements**
5. **Installation of electrical and controls equipment**
6. **Demobilization**

The limits of the Work are illustrated on the construction drawings.

LOCATION OF WORK

This project is located as illustrated on the vicinity map included with the construction drawings.

The Work shall be performed within public right-of-way, on land owned by the Owner, or within easements or rights-of-way obtained by the Owner. Should the Contractor require use of additional space or construction easements, he shall make his own arrangements with the proper parties.

Permits necessary for construction within existing rights-of-way as well as coordination necessary to obtain final acceptance by Kendall County, Kendall County Flood Control District, the City of Boerne, and Guadalupe-Blanco River Authority are the responsibility of the Contractor and will be at the Contractor's expense. The Contractor shall comply with all specifications and standards applicable to construction required by Contract Documents.

EXISTING UTILITIES

The Contractor shall notify the City of Boerne Utilities Department (830-248-1538) a minimum of 48 working hours prior to operating or connecting to any existing facility, and must arrange for and have an appropriate representative of the Operator present to witness all such operations or connections. All existing utilities presented on the construction drawings are shown at the approximate locations based on the best available information. The Contractor shall field determine the exact locations of all existing utilities prior to commencing construction, and shall be fully responsible for any and all damages caused by his failure to exactly locate and maintain these underground utilities. It shall be the Contractor's responsibility to protect and save from damage all utilities, public or private, which are crossed by his construction operations whether shown on the drawings or not. Where existing utilities are cut, broken or damaged, the Contractor shall be responsible for the immediate repair of the utility with the same type of material or better at his own cost and expense.

Where utilities such as underground power, telephone or gas lines are exposed by the Contractor and are in conflict with the proposed construction, the Contractor shall notify the respective utility owner and they shall be lowered or relocated by the respective owners at no cost to the Contractor.

PROTECTIVE MEASURES

Where construction creates possible hazards to traffic or the public safety, the Contractor shall furnish and maintain suitable temporary barricades, warning signs, lights, etc. as required. Expenses for such safety measures will be paid for by the Contractor at no additional cost to the Owner.

SANITARY FACILITIES

The Contractor shall provide and maintain sanitary facilities for persons on the job site that comply with the regulations of State and local departments of health. The Contractor shall enforce the use of such sanitary facilities by construction personnel on the job site. Such facilities shall be enclosed. Pit-type toilets will not be permitted. No discharge will be allowed from these facilities. Collect and store sewage and waste so as not to cause a nuisance or health problem and have the sewer and waste hauled off-site and properly disposed of in accordance with State and local regulations. Locate the sanitary facilities near the work site. Keep the facilities clean and supplied throughout the course of the work. Expenses for installing and maintaining sanitary facilities will be paid for by the Contractor at no additional cost to the Owner.

FINAL GRADES AND CONDITIONS

The Contractor shall restore to original grades and conditions all on-site and off-site properties or facilities damaged by his activity related to the work. The condition of all disturbed areas, upon completion of job, shall be as good or better than the condition prior to starting the Work. The Contractor shall take adequate precautions to avoid sediment, materials, trash, etc. from entering sewers or adjacent properties, both public and private throughout the duration of the project. All work under this item shall be incidental to the other bid items.

GBRA
STANDARD
SPECIFICATIONS

Section 13124: Prefabricated Fiberglass Buildings

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Prefabricated fiberglass buildings to house various equipment including chemical feed systems, process piping, air release valves, pressure transmitters, flow control valves, electrical, SCADA, and/or flow meters; equipment shall be furnished by the contractor and installed onsite by the contractor (not by building manufacturer).

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Society for Testing and Materials (ASTM):
   a. C518, Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
   b. D256, Standard Test Method for Determining the Pendulum Impact Resistance of Notched Specimens of Plastics.
   c. D638, Standard Test Method for Tensile Properties of Plastics.
   d. D732, Standard Test Method for Shear Strength of Plastics by Punch Tool.
   e. D790, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
   f. 792, Standard Test Method for Specific Gravity (Relative Density) and Density of Plastics by Displacement.
   g. D1622, Standard Test Method for Apparent Density of Rigid Cellular Plastics.
   h. D2583, Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
   i. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.

B. Qualifications:

1. Manufacturer's qualifications:
   a. Manufacturer must have minimum of five (5) years’ experience designing and fabricating structures of the type specified.

1.3 SYSTEM DESCRIPTION

A. Building shall be one-piece insulated fiberglass shell-type enclosure with walls, roof, doors, fans, louvers, and other miscellaneous components.

1.4 SUBMITTALS

A. Shop Drawings:

1. Product technical data including:
    a. Product data for all materials and components.
    b. Manufacturer color charts.
    c. Manufacturer's installation instructions.
2. Fabrication drawings:
    a. Drawings showing layout, dimensions, anchorages, and accessories.
    b. Details of anchor bolts, base plates, and all other components fastened to the foundation.
    c. Details of roof panels, wall panels, wall penetrations and escutcheons, reinforcement panels at equipment mounting locations, doors, fans, louvers, and any other components.

B. Operation and Maintenance Manuals.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Jacobs Manufacturing Co.
2. Warminster Fiberglass Co.
3. Or approved equal.

2.2 DESIGN REQUIREMENTS

A. Design enclosure to withstand 125 mile per hour wind load and 30 PSF snow load.

B. Minimum inside dimensions:

1. As shown on drawings.
2. The building size shall be as required to achieve NEC required clearances for all electrical and SCADA components and enclosures and other clearances shown on the contract drawings and GBRA standard details.
3. Wall height shall be 8’-0” minimum.

C. Building foundation/floor, steps/stairs, perimeter curbs, and entrance/exit ramps shall be cast-in-place reinforced concrete in accordance with GBRA Standards and Design Guidelines.

2.3 MATERIALS

A. Molded composite: Exterior and interior resin-fiberglass laminate with foam core.

1. Laminate: Polyester resin and chopped strand fiberglass; minimum glass content of 25%.
   a. Provide gel coat with UV inhibitors.
   b. Exterior surface: Gel coat with low luster finish, smooth and free from fiber pattern, roughness, or other irregularities.
   c. Exterior laminate: 1/8" thick minimum; chemically bonded to gel coat.
   d. Interior laminate: 1/8" thick minimum; encapsulate core in place.
   e. Laminate properties:
      1) Tensile strength (ASTM D638): 11,000 PSI.
      2) Flexural strength (ASTM D790): 18,000 PSI.
      3) Shear strength (ASTM D732): 12,000 PSI.
      4) Barcol hardness (ASTM D2583): 40.
      5) Impact (ASTM D256): 12 ft lbs/inch.
      6) Density/specific gravity (ASTM D792): 93.6 PCF/1.5.
      7) Surface burning characteristics (ASTM E84): Flame spread, less than 150; smoke density, less than 1000.
2. Core:
   a. Rigid closed cell, self-extinguishing, polyisocyanurate foam with a density of 2.0 pounds per cubic foot.
   b. 1" thick with a minimum insulating value of R-7.
   c. Core properties:
      1) Thermal conductivity (ASTM C518): 0.13 BTU inch / Hr. SF F.
      2) Density/specific gravity (ASTM D 1622): 2.0 PCF/.03.
      3) Surface burning characteristics (ASTM E84): Flame spread, 35; smoke density, 240.
3. Coupons prepared in accordance with ASTM D 618 test method.

B. The manufacturer shall maintain a continuous quality control program and upon request shall furnish to the engineer certified test results of the physical properties.

2.4 FABRICATION

A. Construct buildings using prefabricated molded composite wall and roof panels. Provide factory assembled buildings if panel construction is employed.

B. All joints and seams shall be sealed and weatherproof.

C. Roof shall be gable style with 3:12 pitch.

D. Structurally reinforce wall and roof panels to meet loading conditions and to maintain flatness and straightness. Provide reinforcement panels at equipment mounting locations. Reinforcements shall be encapsulated. Assembly bolts shall not penetrate the exterior of the structure.

E. Wall panels shall have an integral 4" wide internal mounting flange pre-drilled on 12" centers with 5/8" diameter holes for attaching to a concrete foundation.

F. Furnish walls, roof, doors, fans, louvers, escutcheon plates, and other miscellaneous components with interior and exterior beige color finish.

2.5 ACCESSORIES

A. Doors and Door Frames: One-piece, resin transfer molded (RTM) in matched metal molds to produce an industrial quality door which exhibits a smooth finished, seamless, monolithic, warp-free composite consisting of gel coat, fiberglass reinforcement, polyester resin, insulating core, and internal reinforcements with all mortises, openings, recesses, and pockets molded in place. Finish color shall match building.

1. Single door minimum size: 3'-0" wide, 7'-0" high, 1 ¾" thick.
2. Double door minimum size: Pair of 2'-6" wide, 7'-0" high, 1 ¾" thick.
3. Doors shall open to exterior.
4. Mount each door with three stainless steel NRP butt hinges 4 ½" long.
5. All other hardware and accessories shall be aluminum and/or stainless steel.
6. All fasteners for all items shall be stainless steel.
7. Provide 18" wide x 12" tall safety wired glass in each door.
8. Provide panic hardware with keyed external lever, and Best Access key system Model SSS-1C6D1626 including control keys.
9. Provide hydraulic closers, Dorma STA8900FMC or equal.
10. Provide door stops and door holders.
11. Provide 12" tall kick plates.
12. Provide natural sponge rubber bulb type door gaskets with flexible lock to retain permanent grip.
13. Provide single flap insert type neoprene sweeps.
14. Provide 4" wide seamless black vinyl thresholds, Home Depot GFTHRESH10MB or equal, attach with adhesive and evenly spaced drive pin anchors, 6 anchors for single doors, 10 anchors for double doors.
15. Provide one-piece purpose built 3" deep fiberglass drip caps above doors, extend 2" past doors on each side. Cut angle will not be acceptable.
16. Install "Danger" signs indicating any type of chemicals or hazards present.

B. Base Mounting Flange Gasket: Provide 3/8" thick by 4" wide closed cell neoprene sponge rubber gasket for a weather tight seal around the building perimeter. Caulk inside and outside perimeters.

C. Lifting Eye Bolts: Provide ¾" stainless steel eye bolts in roof.

D. Anchor Bolts: For attaching structure to concrete pad, provide ½" diameter stainless steel threaded rod, flat washers, and nuts. Secure threaded rod in drilled opening with epoxy anchoring system.

E. Intake Fan: Provide Aerovent Model FDP or equal, with gravity shutter, canopy, and removable aluminum insect screen, wall mount in upper portion of building near corner,

secure to building with aluminum rivets. All components shall be constructed of PVC, FRP, stainless steel, and/or aluminum. Finish color shall match building. Provide one (1) complete air exchange every three (3) minutes.

F. Exhaust Louver: Rectangular, with gravity shutter and removable aluminum insect screen, wall mount in lower portion of building near corner opposite from intake fan, secure to building with aluminum rivets. All components shall be constructed of PVC, FRP, stainless steel, and/or aluminum. Finish color shall match building. Size to accommodate one (1) complete air exchange every three (3) minutes.

G. Split Escutcheon Plates: Round, FRP plate, 1/8" minimum thickness, field install interior and exterior at wall pipe penetrations, secure to building with aluminum rivets. Finish color shall match building.

H. Other Equipment and Appurtenances: Any other equipment or appurtenances identified in the contract documents shall not be furnished or installed by the building manufacturer; such items shall be furnished by the contractor and installed onsite by the contractor and shall be in accordance with GBRA Standards and Design Guidelines. The contractor shall mount these items on strut, unless noted otherwise, and secure the strut to the building with aluminum rivets. The contractor shall coordinate wall penetrations and reinforcement panel sizes and locations for equipment mounting with the building manufacturer (reference Part 2.4.D herein). Equipment and appurtenances by contractor include the following items, and any other items identified in the contract documents:

1. Electrical enclosures, raceways, conductors, and strut.
2. Interior Light Fixtures: Minimum two per building.
3. Exterior Light Fixtures: Minimum one light fixture centered above each door frame.
4. Fan and Light Switches: Weatherproof, outdoor rated, mount on building exterior adjacent to entry door(s).
5. Intake Fan Controls: Provide thermostat control.
6. Receptacles: Minimum three 110V 20A receptacles, one of which shall be a dedicated circuit for a portable heater.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All work shall be in accordance with GBRA Standards and Design Guidelines.

B. Install products in accordance with manufacturer's instructions.

C. All joints and seams shall be sealed and weatherproof.

3.2 ADJUSTING AND CLEANING

A. Touch up any damaged factory finished surfaces or remove and replace as directed by GBRA.

END OF SECTION

Section 13410: Water Delivery Point Process Control Descriptions

REFERENCE DWG(S)	E4, I1
DESCRIPTION:	Delivery site data shall be used within the Water Plants High Service PLC code to update flow calculations for SAWS East delivery control valve. Contractor needs to complete this integration at the plant. Coordination with GBRA required.
GENERAL MONITORING:	Remote control room(s) monitor the following for in-district customer sites: control valve position, fail alarm, and statuses; pipeline pressure and low/high alarms; flow rate and high/low alarms, flow total for the day and yesterday; tank level and customer enable status; facility alarms for power fail and PLC intrusion. Valve fail alarm shall be generated when the valve position disagrees with the command position while in the remote mode. The fail shall have a time delay and dead band adjustment. Daily and lifetime flow total shall be generated from the flow transmitter via Modbus RTU.
LOCAL MANUAL CONTROL MODE:	When the control valve L/O/R switch is in the local position, the valve shall be opened and closed at the local operator station.
LOCAL AUTOMATIC CONTROL MODE:	None
REMOTE MANUAL CONTROL MODE:	When the control valve L/O/R switch is in the remote position, the remote control room(s) HMI operator shall be able to select an AUTO/MANUAL mode. In the MANUAL mode the valve shall be opened and closed by adjusting percent open setpoint.
REMOTE AUTOMATIC CONTROL MODE:	When the control valve L/O/R switch is in remote position and the mode is set to AUTO the valve shall modulate to control the flow rate. The flow rate setpoint shall be the customer daily rate set at the remote control room(s). The modulation shall use a PID control algorithm. There shall be two shutdown control points to close the valve in AUTO mode: 1. If the Ammann Road (Boerne) GST level is higher than the programmed level at which the control valve is called to open, the control valve shall be closed. Control via GST level shall be a local control function. 2. If a system shutdown occurs the control valve shall be closed. The system shutdown for the individual customer site shall be generated from pumping station(s) information by the remote control room(s).

Shutdown Rate: When a shutdown occurs, the valve shall ramp closed on an adjustable rate. This "time to close" setpoint shall be operator adjustable from 1.0 to 3.0 minutes on the remote control room(s) HMI.

NEW SITES: Contractor shall integrate new sites into the applicable existing GBRA control system PLC(s) and HMI(s). New sites must be added to the system flow controls including distribution setpoints.

END OF SECTION

Section 13428: Supervisory Control and Data Acquisition (SCADA)

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Design Phase:

1. Design engineer must obtain GBRA design approval prior to advertising for bids.
2. GBRA shall furnish the cellular communications equipment for integration into the control panel. The System Integrator shall install the equipment in coordination with GBRA and shall not modify, configure, or substitute any components.
3. GBRA-furnished equipment shall include, at a minimum:
   i. Cellular Gateway: Ericsson Cradlepoint R980
   ii. DIN Rail Mount: Ericsson DIN Rail Mounting Bracket (Part No. 170904-001)
   iii. Antenna: Taoglas TGX.04 – 4 x 5G/4G LTE MIMO cross-polarized antenna with multi-mount bracket
4. Configuration, activation, SIM provisioning, firewall rules, VPNs, security hardening, and ongoing management of the cellular gateway shall be performed exclusively by GBRA.
5. The control panel supplier shall provide adequate DIN rail space, physical clearances, and mounting provisions for the GBRA-furnished cellular gateway and associated appurtenances.
6. The control panel shall include a dedicated, labeled power circuit for the GBRA-furnished cellular gateway, complete with appropriate circuit protection (fused or breaker-protected) sized per device requirements.
7. Power and mounting provisions shall be provided only. No cellular device shall be supplied, commissioned, or operated by the panel supplier or System Integrator beyond physical mounting and wiring.
8. Reference GBRA Standards and Design Guidelines for RTU and additional requirements.
9. Reference attached Appendix A “PLC Programming Standards and Best Practices Specification”.

B. Construction Phase:

1. In order to centralize responsibility, all work described in this Section shall be self-performed by a single system subcontractor except where noted otherwise. Contractor shall coordinate and guarantee all work performed by the subcontractor.
2. All work shall be in accordance with this section, the contract documents, and GBRA Standards and Design Guidelines.
3. Subcontractor shall provide all labor, materials, equipment and incidentals necessary to furnish, install, calibrate, test, startup and place in operation a complete and functional SCADA system.
4. Subcontractor shall furnish and install all wiring for the SCADA system.

5. Subcontractor shall perform RTU/PLC programming, HMI/OIT development, and system integration at the project site(s) and at the applicable GBRA control room(s). The program for each PLC must be set to load on uninitialized memory. Include alarm historian at each HMI/OIT. Comply with GBRA revision management policy.

1.2 QUALIFICATIONS AND QUALITY ASSURANCE

A. SCADA subcontractors must be listed as Certified or better by Inductive Automation for Ignition HMI Software; integration must be performed by personnel who are Gold Level Certified or better, experienced, and competent in the implementation of Ignition HMI Software. Submit applicable certifications, experience, and references.

B. PLC programming must be performed by personnel with a minimum of five (5) years' experience of similar scope and magnitude. Submit applicable certifications, experience, and references.

1.3 SUBMITTALS

A. Reference GBRA Standards and Design Guidelines - Section 1.3 for submittal requirements.

B. Submit all applicable shop drawings, diagrams, and schematics.

C. Submit all items described in Paragraph 1.2 above.

D. Submit all proposed HMI/OIT development, PLC programming and network switch configurations. Obtain GBRA approval prior to installation.

1. A mandatory coordination meeting is required prior to preparing submittals for HMI/OIT development. Contractor shall coordinate schedule with GBRA at least ten (10) business days in advance.

E. Reference GBRA Standards and Design Guidelines - Section 1.4 for final completion requirements.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. All materials and equipment shall be stored in accordance with published manufacturer recommendations.

1.5 SPARE PARTS

A. Reference GBRA Standards and Design Guidelines - Appendix C for spare parts requirements.

PART 2 – PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Subcontractor shall be responsible for the installation, programming, and documentation

of all SCADA equipment.

B. Reference GBRA Standards and Design Guidelines for additional requirements.

C. Reference attached Appendix B “OT Network and Communications Standards”.

3.2 CONFIGURATION AND PROGRAMMING

A. Subcontractor shall provide documentation of all parameters for each radio including IP or node addresses, login credentials, encryption keys, etc. This documentation shall be included in the O&M manual.

B. Subcontractor shall perform RTU/PLC programming, HMI/OIT development, and system integration at the project site(s) and at the applicable GBRA control room(s). The program for each PLC must be set to load on uninitialized memory. Include alarm historian at each HMI/OIT. Comply with GBRA revision management policy.

C. A mandatory coordination meeting is required prior to performing any work at the applicable GBRA control room(s). Contractor shall coordinate schedule with GBRA at least ten (10) business days in advance.

3.3 FIELD TESTING AND DEMONSTRATION

A. The contractor and subcontractor shall perform operational demonstration testing and operator training in accordance with GBRA Standards and Design Guidelines prior to placing the facility into service. The entire SCADA system shall be tested, including but not limited to all HMI/OIT features and all signals/points from field equipment/devices to the applicable HMI(s) and OIT(s) at the project site(s) and at the applicable GBRA control room(s). Schedule GBRA to witness the demonstration testing. The contractor and subcontractor shall test and verify complete functionality prior to demonstration testing. Contractor shall coordinate schedule with GBRA at least ten (10) business days in advance.

END OF SECTION

SECTION
13428 – ADDENDUM A

PLC Programming Standards and Best Practices Specification

Purpose and Scope

This specification defines the minimum requirements, approved platforms, and best practices for Programmable Logic Controller (PLC) application development. The intent is to ensure deterministic operation, long-term maintainability, cybersecurity alignment, and consistency across all control systems.

All PLC programming shall use Rockwell Automation Allen-Bradley terminology and adhere to the standards defined herein. Any deviation requires prior written approval from the Owner or Owner's Representative.

Rockwell Automation Alignment Statement

This specification is developed in alignment with Rockwell Automation® / Allen-Bradley® controller architectures, programming tools, and published best practices, including but not limited to Studio 5000 Logix Designer®, FactoryTalk® software platforms, and Logix-family controller design principles.

The intent of this specification is not to contradict or replace Rockwell Automation standards, but to establish OWNER-specific governance, consistency, and lifecycle controls appropriate for owner-operated industrial control systems.

Where this specification imposes requirements that are more restrictive than Rockwell Automation general recommendations, such requirements reflect OWNER's operational, maintainability, cybersecurity, and long-term support objectives and shall take precedence for OWNER-owned systems.

Key clarifications include:

- Approved Toolchains
    - OWNER-approved programming environments represent supported Rockwell Automation platforms selected to ensure consistency, lifecycle stability, and maintainability across OWNER facilities. Restrictions on alternative or legacy tools do not imply technical incompatibility, but rather controlled standardization.
- Programming Architecture and Abstraction
    - While Rockwell Automation supports a wide range of abstraction models, libraries, and frameworks, this specification prioritizes deterministic behavior, transparency of data flow, and owner maintainability. Limitations

on certain abstractions or libraries are policy decisions, not statements of technical deficiency.

- Micro800 Development Environment
    - FactoryTalk® Design Workbench requirements reflect OWNER's strategic alignment with Rockwell Automation's evolving Micro800 development ecosystem. Exception handling is provided to accommodate tool chain transitions where required.
- Firmware and Lifecycle Governance
    - Firmware version requirements are intended to align with Rockwell Automation lifecycle policies while ensuring controlled deployment, supportability, and cybersecurity compliance within OWNER's OT environment.

Contractors, systems integrators, and equipment manufacturers shall not interpret OWNER-specific restrictions as conflicts with Rockwell Automation standards. Any perceived conflict shall be raised through a formal Request for Information (RFI) prior to implementation.

Approved Programming Software and Firmware Requirements

General

Only the software platforms identified in this section are permitted for programming, configuration, and maintenance of PLC controllers. The use of any other programming environment, legacy software, or unsupported toolset is prohibited unless explicitly approved in writing by the Owner.

All PLC firmware shall be maintained at the latest stable, manufacturer-released version throughout the project lifecycle.

2.2 Firmware Version Requirements

Firmware shall be updated to the latest stable version prior to substantial completion.

Firmware versions shall remain consistent across development, testing, commissioning, and final delivery.

Mixing firmware revisions within identical controller families is prohibited without written approval.

Final firmware versions shall be documented in the as-built deliverables.

Firmware versions shall align with OWNER's lifecycle policy unless a higher revision is required to support the approved Studio 5000 release or resolve a documented defect.

Approved Controller Platforms

FactoryTalk® Design Workbench – Micro800™ Controllers

The following Allen-Bradley Micro800™ controller families shall be programmed exclusively using FactoryTalk® Design Workbench, latest supported stable release:

- Micro820™ Controllers (all catalog numbers)
- Micro850™ Controllers (all catalog numbers)

Connected Components Workbench™ (CCW) shall not be used for the development, modification, or maintenance of Micro800™ controller applications under this specification.

This requirement reflects OWNER's strategic direction toward FactoryTalk Design Workbench as Rockwell Automation transitions Micro800 development away from legacy tools.

Project File Format and Deliverables

All controller applications shall be delivered in native FactoryTalk Design Workbench project file format, inclusive of all logic, configuration, libraries, and supporting artifacts.

Projects shall be provided in an unarchived, editable state and shall not be password-protected unless explicitly approved in writing by OWNER.

Final project files shall be submitted at a minimum at the following milestones:

- Substantial completion
- Final system turnover

All delivered files shall represent the as-built configuration of the deployed system.

Source Control and Revision Management

All Micro800 controller projects shall be maintained under formal source control for the duration of the project.

At a minimum, the following versioning practices shall be enforced:

- Incremental revision numbering within the project
- Documented change history identifying:
    - Revision number
    - Date
    - Description of changes
    - Author

Upon final system turnover, OWNER shall receive the latest revision of the project files and associated revision history.

Cloud-hosted or proprietary vendor source control systems shall not be used as the sole repository unless explicitly approved by OWNER.

Firmware Versioning and Lifecycle Alignment

Controller firmware versions shall be:

- Supported by the installed version of FactoryTalk Design Workbench
- Approved by OWNER prior to deployment

Firmware versions shall be selected in alignment with:

- Rockwell Automation product lifecycle status
- OWNER standardization and long-term support policies

Controllers running discontinued, obsolete, or end-of-life firmware shall not be deployed without written approval from OWNER.

Any firmware upgrades required during the project lifecycle shall be coordinated with OWNER and documented as part of the as-built deliverables.

Development Environment and Exception Handling

In the event Rockwell Automation:

- Deprecates, sunsets, or discontinues FactoryTalk Design Workbench, or
- Transitions Micro800 development to an alternate supported platform, the contractor shall notify OWNER in writing.

Any proposed deviation from the specified development environment shall:

- Be formally submitted for OWNER review and approval
- Include justification, lifecycle impact, and compatibility assessment

No alternate development tools or workflows shall be used without prior written authorization from OWNER.

General Programming Philosophy

All PLC applications shall be designed, implemented, and documented to prioritize the following core principles. These principles are mandatory design requirements and shall be used by OWNER to evaluate compliance during design reviews, FAT, SAT, and final acceptance.

Deterministic Execution

Application logic shall be executed in a deterministic and repeatable manner, such that identical inputs under identical operating conditions produce identical outputs.

Control strategies shall avoid constructs that introduce non-deterministic behavior, including but not limited to:

- Uncontrolled event-driven logic
- Unbounded loops or recursion
- Execution paths dependent on asynchronous external communications

Time-critical logic shall be placed in:

- Periodic tasks with defined execution rates, or
- High-priority tasks where explicitly required and approved

Logic execution order shall be intentional and documented, including task, program, and routine structure.

Predictable Scan Time Behavior

Application design shall ensure stable and predictable task execution times under normal and abnormal operating conditions.

Logic shall be structured to prevent excessive scan time growth due to:

- Iterative array processing without bounds
- Large indirect addressing operations
- Communication-dependent blocking instructions

Task configuration shall:

- Use appropriate task types (periodic vs. continuous)

- Include execution rates consistent with process requirements

Worst-case execution time (WCET) shall be considered during design, and logic shall be organized to prevent scan overruns or task starvation.

Diagnostic mechanisms shall be provided where feasible, to allow OWNER personnel to:

- Monitor task execution time
- Identify scan-time anomalies during operation

Transparency of Data Flow

Data movement and ownership shall be explicit and traceable throughout the application.

Control logic shall:

- Use clearly named tags and structures
- Avoid excessive use of indirect addressing or opaque tag references

Data exchange between:

- Tasks
- Programs
- Controllers
- External systems (HMI, SCADA, historians) shall be clearly defined and documented.

Interlocks, permissive, and state transitions shall be implemented in a manner that allows:

- Clear identification of source conditions
- Straightforward troubleshooting without reliance on undocumented behavior

Temporary, intermediate, or calculated values shall not obscure the origin or destination of critical control signals.

Long-Term Maintainability by Owner Personnel

Applications shall be designed with the expectation that OWNER personnel will maintain, troubleshoot, and modify the system over its operational life.

Logic shall favor:

- Readability over excessive optimization
- Standardized programming patterns over custom or proprietary constructs

The use of:

- Custom Add-On Instructions (AOIs)
- Advanced language features
- Vendor- or integrator-specific frameworks

shall be limited to cases where they provide clear operational benefit and are fully documented.

Logic shall be structured to support:

- Incremental modifications
- Safe online edits
- Clear fault isolation

All programming shall be accompanied by sufficient documentation and in-code comments to allow a qualified OWNER controls technician or engineer to understand system behavior without reliance on the original integrator.

Permitted IEC 61131-3 Languages

Only the following languages are permitted:

- Ladder Diagram (LD)
- Function Block Diagram (FBD)
- Structured Text (ST)

Language selection shall be appropriate to the function and applied consistently.

Prohibited Languages and Frameworks

Sequential Function Chart (SFC)

Custom or third-party language extensions

Vendor frameworks that obscure execution order or data flow

Add-On Instructions and User-Defined Logic

Micro800 User-Defined Logic

User-defined constructs in FactoryTalk Design Workbench shall meet the same readability, documentation, and maintainability standards.

Tag Usage and Structured Text Mapping

Tag Aliasing

Tag aliasing or symbolic aliasing is strictly prohibited on all platforms.

All tags shall be base (non-aliased) tags

- Applies to I/O, internal logic, communications, and intermediate variables

Structured Text Mapping Requirement

All tag mapping and data movement between functional domains shall be implemented exclusively within a dedicated Structured Text (ST) routine.

Minimum requirements:

- Clearly named routine (e.g., DataMapping)
- Explicit assignment statements
- Mapping directionality clearly documented

No mapping logic in Ladder Diagram (LD) or Function Block Diagram (FBD) routines

Clear comments for each mapping statement identifying the source and destination tags

The Structured Text mapping routine shall serve as the single source of truth for relationships between:

- Physical I/O
- Internal control logic
- External systems (HMI, SCADA, communications)

Scaling and Signal Conditioning Exception

Function Block Diagram (FBD) routines should be utilized for raw signal scaling and unit conversion prior to mapping.

The following requirements apply:

- Scaling logic shall be isolated in a dedicated FBD routine (e.g., Scaling)

No additional logic, conditional branching, or data routing shall be implemented in the scaling routine

The scaled value produced by the FBD routine shall then be mapped to its final destination exclusively within the Structured Text mapping routine defined.

No direct consumption of raw or scaled values outside of the defined scaling and mapping architecture is permitted.

PLC Tag External Access Requirements

All PLC tags that do not require external write access from SCADA, HMI, historians, or other external systems shall be configured with External Access = Read Only in the PLC. This requirement applies to both Allen-Bradley ControlLogix / CompactLogix controllers and Micro800 controllers using FactoryTalk Design Workbench.

- Requirements:
    - Tags exposed to Ignition, other SCADA clients, or external applications that do not require writes shall have the PLC's External Access property set to "Read Only."
    - Tags that must be written by SCADA or HMI (e.g., operator control bits, setpoints) shall be explicitly documented and have External Access = Read/Write.
    - Tags that are internal to PLC logic and should not be visible externally should be configured with External Access = None, where appropriate.
    - All Micro800 tag settings shall be configured using FactoryTalk Design Workbench, ensuring the same External Access principles are applied as in Studio 5000 Logix Designer.
    - All external access settings shall be reviewed and confirmed during design review, FAT, and SAT to ensure compliance.
- Rockwell Automation Guidance:
  Rockwell's PLC platforms provide the External Access attribute for all tags:
    - Read Only – External systems can read the tag but cannot modify it.
    - Read/Write – External systems can read and write the tag.
    - None – External systems cannot read or write the tag.
      Applying these settings ensures controlled exposure of PLC data, prevents unauthorized writes, and reduces operational and cybersecurity risks.
- Rationale:
    - Configuring unused or non-control tags as Read Only prevents unintended modifications from Ignition or other external interfaces, mitigating risks of accidental control actions, logic interference, or cybersecurity vulnerabilities.
    - This practice aligns with Rockwell Automation's recommended external access settings for PLC tags and ensures consistent integration across ControlLogix, CompactLogix, and Micro800 platforms.

- Enforcement:
    - Tags incorrectly configured for external write access shall be flagged during review prior to substantial completion.

Alarm Programming Standards

Allen-Bradley® Micro800™ Controllers – FactoryTalk® Design Workbench

- Alarms shall be implemented using explicit Ladder Diagram seal-in logic with configurable delays
- Alarms shall be non-latching and self-clearing
- No acknowledgement or remote reset unless approved
- All alarms shall reside in a ladder diagram routine named Alarms

Supplemental Process Devices and Protocol Converters

This section applies to Supplemental process devices used in support of PLC and SCADA systems, including but not limited to protocol converters, gateways, data concentrators, and communications translators.

Approved Devices

- Only OWNER-approved supplemental process devices shall be furnished and installed.
- The use of any protocol converter or communications gateway shall require:
    - Prior identification during the design phase, and
    - Written approval from OWNER before procurement or installation.
- Substitution of Supplemental devices without OWNER approval is prohibited.

Configuration Software and Licensing

Any device-specific configuration, programming, or diagnostic software required to configure, commission, or maintain the Supplemental device shall be:

- Provided to OWNER at no additional cost
- Licensed for OWNER use without time limitation where available

Software delivery shall include:

- Installation media or download access
- License keys, dongles, or activation files, if applicable

- Vendor documentation sufficient to allow independent OWNER use

Cloud-only, subscription-only, or integrator-hosted configuration tools shall not be used unless explicitly approved in writing by OWNER.

Configuration Files and Backup Requirements

Complete backup copies of all Supplemental device configurations shall be provided to OWNER.

Backup deliverables shall include, at a minimum:

- Native configuration files in the manufacturer's format
- Exported configuration files, where supported
- Documentation identifying firmware versions and device settings

Backup files shall reflect the as-built configuration of the installed device.

Submittal Timing and Acceptance

All required software, licenses, and configuration backups shall be delivered to OWNER prior to substantial completion.

Failure to provide the required deliverables shall constitute:

- Grounds for withholding substantial completion acceptance.

OWNER reserves the right to:

- Review supplemental device configurations
- Require configuration changes prior to acceptance

Documentation and Maintainability

Supplemental devices shall be configured in a manner that supports:

- Long-term maintainability by OWNER personnel
- Device replacement without vendor or integrator dependency
- Configuration shall not rely on:
    - Hidden credentials
    - Proprietary locks
    - Integrator-only access mechanisms

Approved Protocol Converter Examples and Acceptance Criteria

The following examples are provided to illustrate typical classes of acceptable protocol converters. These examples are not an approved vendor list and do not relieve the contractor of the requirement to obtain OWNER approval in accordance with Section 9.1.

Typical Acceptable Use Cases

Approved protocol converters may include devices used for, but not limited to, the following functions:

- Modbus RTU to Modbus TCP/IP protocol translation
- Modbus TCP/IP to EtherNet/IP™ protocol translation
- Serial (RS-232 / RS-485) to EtherNet/IP™ protocol translation
- DNP3 to EtherNet/IP™ protocol translation
- Legacy device integration where native PLC communication is not available

9.6.3 Cybersecurity and Network Considerations

Protocol converters shall:

- Support basic cybersecurity controls appropriate for OT environments, including:
    - User authentication and role-based access, where supported
    - Configurable network services and ports
- Allow unused services and protocols to be disabled.
- Be deployable within OWNER's OT network architecture without violating:
    - Network segmentation requirements
    - Firewall and access control policies

9.6.4 Disallowed Characteristics

The following characteristics are not acceptable unless explicitly approved in writing by OWNER:

- Devices that rely on vendor-hosted or cloud-based services for configuration or operation
- Devices that do not support local configuration backup
- Devices that obscure data mapping or protocol behavior
- Devices that cannot be independently maintained by OWNER personnel

9.6.5 Approval Authority

Final determination of protocol converter acceptability rests solely with OWNER.

OWNER may require:

- Additional technical documentation
- Bench testing or demonstration
- Configuration review prior to approval

SECTION
13428 – ADDENDUM C

OT Network and Communications Standards

General

All OT Ethernet and serial networks shall be designed for deterministic performance, maintainability, and cybersecurity alignment with IEC 62443 principles.

SCADA Addressing Assignments

Document Purpose

This document defines mandatory formatting, data entry, and submission requirements for the "**SCADA Addressing Assignments**" Microsoft Excel workbook. This workbook supports asset identification, network zone and conduit definition, and address management in accordance with IEC 62443 Industrial Automation and Control Systems (IACS) cybersecurity standards. The Systems Integrator shall develop and comply with this document when submitting Ethernet IP address and Serial Node ID requests for OWNER review and acceptance.

Cybersecurity and Terminology Alignment (IEC 62443)

- All devices identified in the workbook shall be considered Industrial Automation and Control System (IACS) assets as defined by IEC 62443.
- IP addressing and Serial Node assignments support logical segmentation of security zones and conduits in accordance with IEC 62443-3-2.
- Each listed device shall represent a uniquely identifiable asset supporting asset inventory, risk assessment, and security level determination.
- Address assignments shall not circumvent established security zones, conduits, or network segmentation controls.
- No device shall communicate outside its assigned zone or conduit without written authorization from OWNER.

General Workbook Requirements

- The system integrator and any original equipment manufacturer suppliers shall design and submit a Microsoft Excel workbook with dedicated sheets for "Ethernet Devices" and "Serial Devices".

- Only fields intended for systems integrators or original equipment manufacturers shall be populated.
  All fields identified with "***" are intended for OWNER to populate.
- Fields identified as "Assigned by OWNER" shall be left blank at time of submission.

Ethernet Devices Worksheet (IEC 62443 Asset Identification)

The "**Ethernet Devices**" worksheet shall be used to identify and request IP address assignments for all Ethernet-connected IACS assets.

The following fields shall be completed for each Ethernet-connected asset:

• **DESCRIPTION**– Functional description of the asset within the IACS.

Example: Influent Pump Station Controller

• **HOST NAME**– Unique asset identifier consistent with OWNER naming standards.

Example: ILS_PLC

• **MANUFACTURER** – Asset manufacturer.

Example: Allen Bradley

• **MODEL**– Asset model designation.

Example: 5069-L306ER

• **PORT**– Network Interface Identification

Example: Embedded A2 Port

Example: Network Switch (ESW-01) Embedded Port 1

• **LOCATION / NOTES** – Physical location and logical network zone information.

Example: Inside influent pump station RTU cabinet. Contained within local control network.

• ***IP ADDRESS** (*Assigned by OWNER*) – Shall be left blank.

Serial Devices Worksheet (IEC 62443 Asset Identification)

The "**Serial Devices**" worksheet shall be used to identify and request Serial Node ID assignments for all serially connected IACS assets.

The following fields shall be completed for each serially connected asset:

• **DESCRIPTION**– Functional description of the asset within the IACS.

Example: Effluent Pump Station Flow Meter

- **MANUFACTURER** – Asset manufacturer.

  Example: Endress Hauser

- **MODEL**– Asset model designation.

  Example: Proline Promag P300

- **PORT / TERMINATION** – Physical interface and communication channel details.

  Example: Embedded Terminal Block

- **MODBUS ROLE** – Physical interface and communication channel details.

  Example: Master Node, Slave Node, Repeater

- **BAUD RATE** – Physical interface and communication channel details.

  Example: 19200

- **PARITY** – Physical interface and communication channel details.

  Example: None

- **PROTOCOL CONTROL**– Physical interface and communication channel details.

  Example: RS-485

- **DATA BITS** – Physical interface and communication channel details.

  Example: 8

- **STOP BITS** – Physical interface and communication channel details.

  Example: 1

- **LOCATION / NOTES** – Physical location and zone or conduit association.

  Example: Located in effluent valve building. Connected to Effluent pump station PLC 5069-SERIAL module's local serial network.

- ***NODE ID** (*Assigned by OWNER*) – Shall be left blank.

- ***BINDING CODE** (*Assigned by OWNER*) – Shall be left blank. Only included if applicable.

Submission, Review, and Cybersecurity Enforcement

- The completed workbook shall be submitted in native Microsoft Excel (.xlsx) format. Incomplete, improperly formatted, or non-compliant submissions shall be rejected without review.
- The Systems Integrator or original equipment manufacturer shall allow a minimum of two (2) weeks for OWNER review, risk evaluation, and assignment.
- Assigned IP addresses and Serial Node IDs shall not be implemented until written approval is received from OWNER.
- Unauthorized addressing, duplication, or modification of assigned addresses constitutes a cybersecurity non-conformance under IEC 62443 and shall be subject to corrective action.
- Compliance with this document is mandatory for all PLCs, HMIs, network infrastructure, and field-connected IACS assets.

Communication Protocols

Ethernet

- EtherNet/IP is preferred
- Modbus TCP permitted only where EtherNet/IP is unavailable.
- All Micro820 and Micro850 Modbus TCP explicit communications shall be via FactoryTalk Design Workbench software.

Serial

- Modbus RTU over RS-485 only unless approved by OWNER
- Existing serial network parameters shall be matched exactly
- All CompactLogix™ 5380 Controllers shall use the 5069-SERIAL module for all RS-485 communications.

PLC Communications

Point-to-Point Communications Over Wired Ethernet Media

- All Micro820® and Micro850® controller-to-controller communications over wired Ethernet media shall utilize EtherNet/IP™ Class 3 (Explicit) messaging implemented using CIP Symbolic or CIP Generic MSG instructions, as supported by the Micro800® controller platform.
- Deviation from the preferred communication methods defined above shall require submission of a Request for Information (RFI). The RFI shall include a technical justification describing the constraint or limitation requiring the deviation.

- The Contractor shall allow a minimum review period of two (2) weeks from the date the request is received by OWNER.

Point-to-Point Communications Over Wireless Ethernet Media

- All Micro820® and Micro850® controller-to-controller communications over wireless Ethernet media shall utilize EtherNet/IP™ Class 3 (**Explicit**) messaging implemented using CIP Symbolic or CIP Generic MSG instructions.
- Deviation from the preferred communication methods defined above shall require submission of a Request for Information (RFI).
- The Contractor shall allow a minimum review period of two (2) weeks from the date the request is received by OWNER.

Micro800® Controller Specific Requirements

- All serial communications associated with Micro800® controllers shall utilize the 2080-SERIALISOL isolated serial plug-in module.
- The embedded serial interfaces shall not be used.
- The Modbus TCP Server functionality shall be enabled regardless of whether Modbus TCP communications are actively utilized.
- All process device EtherNet/IP™ communications shall utilize Class 1 (Implicit) connections where supported and configured through connected CIP objects in FactoryTalk® Design Environment. Some of these devices include but are not limited to:
    - Flow Meters
    - Level Indicators
    - Power Quality Meters
    - HART Gateways

Network Performance and Bandwidth

General Network Utilization

The industrial ethernet network shall be designed in accordance with Rockwell Automation EtherNet/IP™ design and performance best practices and the Purdue Enterprise Reference Architecture (PERA) for Industrial Control System (ICS) security.

Network utilization calculations shall include all CIP traffic types, including:

- Class 1 Implicit I/O traffic
- Class 3 Explicit Messaging

- Produced/Consumed tags
- HMI and SCADA communications
- Device diagnostics, alarms, and management traffic

The system integrator shall consider worst-case conditions such as:

- Simultaneous controller power-up
- Network reconvergence
- Wireless or cellular retransmissions

These thresholds are intended to preserve deterministic behavior, reduce packet loss, and maintain compliance with Rockwell Automation performance recommendations.

Requested Packet Interval (RPI) Selection

Requested Packet Intervals (RPIs) for EtherNet/IP™ Class 1 connections shall be selected based on actual process requirements and not configured arbitrarily.

RPIs shall be justified based on:

- Process dynamics and control response requirements
- Controller scan time and task execution rate

RPIs shall not be configured artificially low to improve perceived responsiveness.

For non-time-critical data, slower RPIs or Class 3 Explicit Messaging shall be used.

Any RPI configured below 10 milliseconds shall require documented justification and approval by OWNER.

The system integrator shall ensure that the aggregate RPI loading does not exceed the practical throughput limits of the controller, communication modules, or network infrastructure.

2.4 CIP Connection Management

CIP connections shall be managed to ensure reliable and predictable network performance.

Class 1 Implicit Messaging shall be limited to time-critical control I/O and PLC to PLC communications only.

Class 3 Explicit Messaging shall be used for:

- SCADA polling
- HMI data access

- Diagnostics and status monitoring
- Non-critical inter-controller data exchange

The system integrator or original equipment manufacturer shall avoid excessive simultaneous CIP connection establishment events that could overload the controller's processing capacity.

Wireless and Cellular Communications

Wireless and cellular network paths introduce variable latency and limited throughput and shall be designed accordingly.

Wireless links shall use throttled Class 3 Explicit Messaging only.

Class 1 Implicit I/O connections over wireless or cellular links are not permitted.

Message instructions shall be:

- Initiated sequentially rather than concurrently
- Rate-limited to control peak bandwidth usage
- Configured with appropriate timeout and retry values for high-latency environments

Message payload sizes shall be optimized to minimize bandwidth consumption and retransmissions.

Polling rates over wireless links shall be aligned with realistic throughput and latency expectations rather than wired Ethernet performance assumptions.

Performance Margin and Expansion

The network design shall maintain sufficient margin for future expansion and abnormal conditions.

Network utilization thresholds shall be met with at least 20% additional capacity remaining for future devices, additional tags, or expanded SCADA functionality.

Communication modules, switches, and wireless gateways shall not be deployed at or near maximum capacity.

Cybersecurity (IEC 62443 Alignment)

Network Architecture Diagrams and Approval Requirements

General Requirements

The Systems Integrator shall develop a detailed network architecture diagram for all PLC, HMI, SCADA, and networked field devices associated with the project.

The system integrator shall submit network architecture diagrams in accordance with the best industry practices including Purdue Enterprise Reference Architecture (PERA) for Industrial Control System (ICS) security.

Submitted network maps shall include high-level architecture, logical network topology, and physical connectivity diagrams. Diagrams shall clearly identify network zones, conduits, IP addressing, VLANs, communication paths, and security boundaries.

Network diagrams shall be submitted for review prior to substantial completion and updated to reflect as-built conditions prior to final acceptance.

The network architecture diagram shall be submitted to OWNER for review and written approval prior to:

- Final network configuration
- PLC program finalization

No field implementation, configuration, or addressing shall occur without written approval of the network architecture diagram by OWNER.

Diagram Content and Format Requirements

The network architecture diagram shall be a single, consolidated drawing clearly illustrating:

- All PLCs and controller families (CompactLogix™, ControlLogix®, Micro800®)
- Ethernet interfaces and port assignments
- Network segmentation boundaries
- All connected devices and communication paths

The diagram shall also identify ethernet interfaces using Fortinet and Cisco-consistent terminology as well if applicable.

Communication paths shall be clearly annotated to identify:

- EtherNet/IP™ Class 1 (Implicit) communications

- EtherNet/IP™ Class 3 (Explicit) communications
- Modbus TCP communications
- Modbus RTU communications

IEC 62443 Zone and Conduit Identification

The network architecture diagram shall explicitly identify PERA security zones for all devices and networks.

At a minimum, the following zone designations shall be used:

- Zone Z2 – Enterprise / SCADA Zone (PLC WAN)
    - Supervisory control systems, SCADA HMIs, historians, PLC-to-PLC communications, and gateway devices.

- Zone Z0/1 – Controller Local Area Network (PLC LAN)
    - Process-level devices including drives, instrumentation, control valves, local HMIs, and remote I/O.

Network segmentation between zones shall be clearly illustrated, and all communications between zones shall occur only through the PLC, unless otherwise approved in writing by OWNER.

Any additional zones or conduits proposed by the Systems Integrator shall be explicitly identified and justified as part of the diagram submittal.

Standard Architecture Compliance

The following architectural constraints shall be enforced:

- Enterprise / SCADA networks (PLC WAN) shall not directly connect to process-level devices
- Process-level devices shall not communicate over Enterprise-designated interfaces (PLC WAN)
- External systems shall not directly access the Controller Local Area Network (PLC LAN)

Deviations from the standard architecture shall require submission of a Request for Information (RFI) and shall not be implemented without written approval from OWNER.

Review, Approval, and Enforcement

OWNER shall review the submitted network architecture diagram for:

- Alignment with OWNER SCADA, cybersecurity, and OT network standards

Network diagrams that are incomplete, improperly formatted, or non-compliant shall be rejected without approval.

Approved network architecture diagrams shall become controlled project documents and shall be used as the basis for:

- IP address and node assignment approval
- PLC and HMI configuration
- FAT, SAT, and commissioning validation

Unauthorized deviations from an approved network diagram constitute **cybersecurity non-conformance** and may result in required rework at no additional cost to OWNER.

Cybersecurity Best Practices and Compliance

The Systems Integrator or original equipment manufacturer shall implement industry-recognized cybersecurity best practices in the development of all network architecture diagrams, configurations, and implementations.

Cybersecurity practices shall align with, at a minimum:

- IEC 62443 Industrial Automation and Control Systems (IACS) cybersecurity standards
- Purdue Enterprise Reference Architecture (PERA) for Industrial Control System (ICS) security
- OWNER SCADA and OT cybersecurity policies, where applicable

The network architecture shall be designed to minimize attack surface, enforce segmentation, and reduce the potential for unauthorized access, including but not limited to:

- Logical separation of security zones and conduits
- Least-privilege communication paths
- Elimination of unnecessary services, protocols, and network exposure

Default configurations, credentials, and open services shall not be relied upon as part of the final system architecture.

Routing, bridging, or inter-zone communication shall not be implemented unless explicitly shown on the approved network architecture diagram and approved in writing by OWNER.

OWNER reserves the right to require corrective actions or architectural changes if the submitted or implemented design is determined to present a cybersecurity risk, does not align with accepted industry practices, or does not align with OWNER OT network required practices.

Purdue Model Alignment for ICS Security

The network architecture shall be designed in accordance with the Purdue Enterprise Reference Architecture (PERA) for Industrial Control System (ICS) security.

All devices, systems, and communication paths shall be logically mapped to appropriate Purdue levels, including but not limited to:

- Level 4/5 – Enterprise IT and external networks
- Level 3 – Site Operations and Manufacturing Operations Management
- Level 2 – Area Supervisory Control (SCADA and HMI systems)
- Level 1 – Basic Control (PLCs and controllers)
- Level 0 – Process devices and instrumentation

The submitted network architecture diagram shall explicitly indicate Purdue level boundaries and show how those boundaries align with IEC 62443 security zones and conduits.

Communications between Purdue levels shall be limited to those required for operational functionality and shall be explicitly identified on the approved network architecture diagram.

Direct communications that bypass intermediate Purdue levels shall not be permitted unless approved in writing by OWNER following a documented cybersecurity risk review.

Network architecture shall support defense-in-depth principles, including layered security controls between Purdue levels and IEC 62443 zones.

Purdue level segmentation, IEC 62443 security zones and conduits, collectively define the minimum acceptable cybersecurity architecture for OWNER SCADA and OT systems.

Remote Access Requirements

General Prohibition

Remote access to any OWNER SCADA, PLC, HMI, or OT system is strictly prohibited.

No remote connectivity shall be enabled, installed, configured, or left dormant within any system, device, or network component without prior written approval from OWNER.

This prohibition applies to all forms of remote access, including but not limited to:

- VPN connections
- Cellular modems and routers
- Cloud-based access services
- Vendor-managed remote support tools
- Remote desktop or web-based interfaces
- Remote PLC/RTU connections

Warranty obligations, vendor support agreements, convenience, continuous monitoring, data collection, or troubleshooting preferences shall not be considered a critical operational need and shall not justify remote access.

Sustained, persistent, or continuous connections, including but not limited to streaming or ongoing data transfers from OWNER SCADA systems, are strictly prohibited.

Enforcement and Non-Compliance

- Any unauthorized remote access capability identified by the OWNER at any point in the project shall be considered a cybersecurity non-conformance.
- OWNER reserves the right to require:
    - Immediate removal or disabling of unauthorized remote access
    - System reconfiguration or revalidation
    - Rejection of substantial completion or final acceptance
    - Rework at no additional cost to OWNER
- Discovery of unauthorized remote access may result in suspension of work or denial of system acceptance.

Reference Standards

- Purdue Enterprise Reference Architecture (PERA)
- OWNER SCADA and OT Cybersecurity Policies

Section 13442: Flanged Magnetic Flow Meters

A. Acceptable manufacturers:

1. Endress + Hauser
2. Rosemount
3. Substitutions are not allowed.

B. Design and fabrication requirements:

1. All materials and components shall be chemical resistant and compatible with the intended process fluid in accordance with published manufacturer recommendations.
2. Utilize characterized field principle of electromagnetic induction to produce signal directly proportional to flow rate.
3. High input impedance pre-amplifiers, minimum impedance shall be 10^{10} ohms.
4. Provide flanged end connections per ANSI/ASME B16.5 to match rating of piping system.
5. Grounding: Provide inlet and outlet grounding rings of same material as electrode.
6. Provide cable between magnetic flow meter and transmitter. Cable length shall be 10m minimum. The contractor shall cut cable in the field to suit actual field installation. Splicing is not allowed.
7. The signal converter shall be remotely mounted using a remote-mount kit provided by the manufacturer. The transmitter shall be FM approved. Rating shall be at least NEMA 4X with separate electronics and termination areas.
8. Submergence: The sensor shall be sealed and rated for permanent submergence to 30 feet.
9. Pulsed DC magnetic field excitation.
10. Automatic zero.
11. Adjustable low flow cutoff.
12. Minimum signal lock (empty tube zero) to prevent false measurement when tube is empty.
13. Inaccuracy:
    a. Above 10 percent of range: +/-1.0 percent of rate.
    b. Below 10 percent of range: +/-0.1 percent of range setting.
    c. Add +0.1 percent of range to above inaccuracies for analog outputs.
14. Communication with PLC shall be Ethernet IP or Modbus RTU.
15. Power Supply: 120 V +/-10 percent, 60 Hz.
16. Provide surge protection.
17. Provide local operator interface display with indication of flow rate and totalized flow at transmitter.
18. Meter operable as specified in liquids with 5.0 micro mho/cm or more conductivity.
19. Transmitter electronics shall utilize microprocessor based architecture and be configured using parameters.
20. Repeatability: +/- 0.1% of reading or better.
21. The meter shall be capable of automatically indicating zero flow under empty pipe conditions.

22. Flow meter performance shall be verified on a NIST traceable test facility. Contractor shall submit factory and field calibration certificates for all flow meters.
23. Instruments shall be designed and manufactured under the ISO 9001 series of quality standards.
24. Menu or programming changes shall be capable of being performed without removing covers.
25. Instruments shall be capable of storing data in non-volatile memory for a minimum of ten (10) years.
26. The instrument shall have password protection to prevent unauthorized personnel from making settings and programming changes.

C. Installation: Provide unobstructed upstream and downstream straight pipe diameters in accordance with published manufacturer recommendations.

END OF SECTION

SPECIAL SPECIFICATIONS

SECTION 01 75 00

STARTING OF SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK:

A. Contractor shall initially start up and place all equipment installed during the Project into successfully operation according to manufacturer's written instructions and as instructed by manufacturer's field representative. Provide all materials, labor, tools, equipment, and expendables required.

B. General Activities Include:

1. Cleaning.

2. Removing temporary protective coatings.

3. Flushing and replacing greases and lubricants, where required by manufacturer.

4. Lubrication.

5. All adjustments required.

C. Provide initial filling of lubricants and all other required operating fluids.

D. Also provide fuel, electricity, water, filters, chemicals and other expendables required for initial start-up of equipment unless otherwise specified.

1.02 MINIMUM START-UP PROCEDURES:

A. Valves

1. Inspect both manual and automatic control valves, clean bonnets and stems.

2. Tighten packing glands to assure no leakage but permit valve stems to operate without galling.

3. Replace packing in valves to retain maximum adjustment after system is judged complete.

4. Replace packing on any valve which continues to leak.

5. Remove and repair bonnets which leak.

6. Coat packing gland threads and valve stems with an appropriate surface preparation after cleaning.

B. Verify that control valve seats are free from foreign material and are properly positioned for intended service.

C. Tighten all pipe joints after system has been placed in operation. Replace gaskets which show any sign of leaking after tightening.

D. Inspect all joints for leakage.

1. Promptly remake each joint which appears to be faulty, do not wait for rust to form.

2. Clean threads on both parts, apply compound and remake joints.

E. After system has been placed in operation, clean strainers, dirt pockets, orifices, valve seats, and headers in fluid system, to assure freedom from foreign materials.

F. Open traps and air vents where used, remove operating elements. Clean thoroughly, replace internal parts and put back into operation.

G. Remove rust, scale and foreign materials from equipment and renew defaced surfaces.

H. Set and calibrate equipment.

I. Check each electrical control circuit to assure that operation complies with Specifications and requirements to provide desired performance.

J. Inspect each pressure gauge and thermometer for calibration. Replace items which are defaced, broken, or which read incorrectly.

K. Repair damaged insulation.

L. Vent gases trapped in any part of systems. Verify that liquids are drained from all parts of gas or air system.

1.03 INITIAL START-UP:

A. Prior to start-up of the facilities, the Contractor shall have prepared and pre-tested all equipment insofar as possible to check its ability for sustained operation, including inspections and adjustments by manufacturer's servicemen.

B. After the facilities are sufficiently complete to permit start-up, the Contractor shall furnish competent personnel to start-up the facilities. The Contractor will be responsible for start-up of all facilities constructed under this Contract. Insofar as possible, the manufacturer's representatives shall be present during this period to instruct the system operators in the care, operation, and maintenance of the equipment.

Prior to start-up, the Contractor shall prepare a schedule detailing the proposed start-up and plans for manpower and auxiliary facilities to be provided. The start-up schedule is subject to approval of the Owner.

C. Permanent power service is required for testing and initial start-up. The Contractor shall make all arrangements to provide this power service via the permanent electrical service facilities.

END OF SECTION

SECTION 01 75 16

FACILITY STARTUP

PART 1 - GENERAL

1.01 DEFINITIONS:

A. Reference 01 75 00, STARTING OF SYSTEMS.

B. Functional Test: A test or tests to demonstrate that the installed equipment or system meets manufacturer's installation and adjustment requirements and other requirements specified including, but not limited to, noise, vibration, alignment, speed, proper electrical and mechanical connections, thrust restraint, proper rotation, and initial servicing.

C. Performance Test: A test performed in the presence of the Owner and after any required functional test specified, to demonstrate and confirm that the equipment and/or system meet the specified performance requirements.

D. System: The overall process, or a portion thereof, that performs a specific function. A system may consist of two or more subsystems as well as two or more types of equipment. Examples of systems on this Project are as follows:

1. Control valves.

2. Instrumentation and control system(s).

1.02 SUBMITTALS:

A. Administrative Submittals.

1. Functional and performance test schedules and plan for equipment, units, and systems at least 60 days prior to start of related testing. Include test plan, procedures, and log format.

2. Schedule and plan of startup activities at least 30 days prior to commencement.

B. Quality Control Submittals.

1. Manufacturer's Certificate of Proper Installation as required.

2. Test Reports: Functional and performance testing, in format acceptable to Owner and certification of functional and performance test for each piece of equipment or system specified.

3. Certifications of Calibration: Testing equipment.

1.03 CONTRACTOR FACILITY STARTUP RESPONSIBILITIES:

A. General.

1. Perform Work for tests specified.

2. Demonstrate proper installation, adjustment, function, performance, and operation of equipment, systems, control devices, and required interfaces individually and in conjunction with process instrumentation and control system.

1.04 OWNER'S FACILITY STARTUP RESPONSIBILITIES:

A. General.

1. Review Contractor's test plan and schedule.

2. Witness performance testing.

B. Startup Test Period.

1. Operate process units and devices, with support of Contractor.

2. Provide sampling, labor, and materials as required and provide laboratory analyses.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 TESTING PREPARATION:

A. General.

1. Complete Work associated with the unit and related processes before testing, including related manufacturer's representative services.

2. Furnish qualified manufacturer's representatives when required to assist in testing.

3. Schedule and attend pretest (functional and performance) meetings related to test schedule, plan of test, materials, chemicals, and liquids required, facilities' operations interface, Owner involvement.

4. Designate and furnish one or more persons to be responsible for coordinating and expediting Contractor's facility startup duties. The person or persons shall be present during facility startup meetings and shall be available at all times during the facility startup period.

5. Provide temporary valves, gauges, piping, test equipment and other materials and equipment required to conduct testing.

B. Cleaning and Checking: Prior to starting functional testing.

1. Calibrate testing equipment for accurate results.

2. Inspect and clean equipment, devices, connected piping, and structures so they are free of foreign material.

3. Lubricate equipment in accordance with manufacturers' instructions.

4. Turn rotating equipment by hand and check motor-driven equipment for correct rotation.

5. Open and close valves by hand and operate other devices to check for binding, interference, or improper functioning.

6. Check power supply to electric-powered equipment for correct voltage.

7. Adjust clearances and torque.

8. Test piping for leaks.

C. Ready-to-test determination will be by Owner based at least on the following:

1. Notification by Contractor of equipment and system readiness for testing.

2. Acceptable testing plan.

3. Acceptable Operation and Maintenance Manuals.

4. Receipt of Manufacturer's Certificate of Proper Installation, if specified.

5. Adequate completion of Work adjacent to, or interfacing with, equipment to be tested.

6. Availability and acceptability of manufacturer's representative, when specified, to assist in testing of respective equipment, and satisfactory fulfillment of other specified manufacturers' responsibilities.

7. Equipment and electrical tagging complete.

8. All spare parts and special tools delivered to Owner.

3.02 FUNCTIONAL TESTING-GENERAL:

A. Conduct functional tests as specified for each equipment item or system.

B. Demonstrate all operational features and instrumentation and control functions while in automatic mode.

C. Coordinate with Owner as needed to confirm functionality of all equipment.

D. Performance testing shall not commence until the equipment or system meets the specified functional tests.

3.03 PERFORMANCE TEST-GENERAL:

A. Begin testing at a time mutually agreed upon by the Owner and Contractor.

B. Owner will be present during test. Notify in writing manufacturers representative(s) at least 21 days prior to scheduled date of functional tests.

C. Conduct performance tests as specified for each equipment item or system.

D. Unless otherwise indicated, furnish all labor, materials, and supplies for conducting the test and taking all samples and performance measurements.

E. Prepare performance test report summarizing test method. Include test logs, pertinent calculations, and Contractor's written certification that the equipment or system performs as specified.

3.04 STARTUP TEST PERIOD:

A. General.

1. Attend planning meetings and arrange for attendance by key major equipment manufacturer representatives as required by the Contract Documents.

2. Designate one or more persons on the Contractor's staff to be able for coordinating and expediting Contractor's facility response startup duties.

3. When facility startup has commenced, schedule remaining Work so as not to interfere with or delay the completion of facility startup.

4. Support facility startup activities with adequate staff to prevent delays. Such staff shall include, but not be limited to, major equipment and system manufacturer's representatives, electricians, instrumentation and control personnel, millwrights, pipe fitters, and plumbers.

5. Furnish and coordinate specified manufacturer's facility startup services.

6. After the facility is operating, complete the testing of those items of equipment, systems, and subsystems, which could not or were not successfully tested prior to the startup test period.

B. Startup Testing.

1. Startup of the entire facility or any portion thereof requires the coordinated operation of the facilities by the Contractor, subcontractors, Owner's operating personnel, and manufacturer's representatives.

2. Startup test period shall occur after all required functional tests have been completed and those performance tests deemed necessary for the safe operation of the entire facility have been completed.

3. Startup of the entire facility or any portion thereof shall be considered complete when, in the opinion of the Owner, the facility or designated portion has operated in the manner intended for 5 continuous days without significant interruption. This period is in addition to any training, functional or performance test periods specified elsewhere.

4. Significant interruption may include any of the following events.

    a. Failure of Contractor to maintain qualified onsite startup personnel as schedule.

    b. Failure to meet specified performance for more than 2 consecutive hours.

    c. Failure of any critical equipment unit, system, or subsystem that is not satisfactorily corrected within 5 hours after failure.

    d. Failure of any non-critical unit, system, or subsystem that is not satisfactorily corrected within 8 hours after failure.

    e. As may be determined by Owner.

5. A significant interruption will require the startup then in progress to be stopped and restarted after corrections are made.

C. Startup Test Reports: As applicable to the equipment furnished, certify in writing that:

1. Hydraulic structures, piping systems, and valves have been successfully tested.

2. Equipment systems and subsystems have been checked for proper installation, started, and successfully tested to indicate that they are operational.

3. Systems and subsystems are capable of performing their intended functions, including fully automatic.

4. Facilities are ready for intended operation.

END OF SECTION

SECTION 26 01 00

BASIC ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 RELATED SECTIONS

A. Requirements specified within this section apply to all sections in Division 26, ELECTRICAL. Work specified herein shall be performed as if specified in the individual sections. The CONTRACTOR shall review installation procedures under other sections and coordinate the installation with all other trades.

1.02 STANDARDS

A. All electrical equipment and controls furnished under the provisions of this Section of the specifications shall conform to the current standards, rules, regulations and specifications of the following authorities:

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

AMERICAN SOCIETY OF TESTING AND MATERIALS (ASTM)

AMERICAN WATERWORKS ASSOCIATION (AWWA)

GBRA STANDARDS

FACTORY MUTUAL (FM)

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

INSULATION CABLE ENGINEERS ASSOCIATION (ICEA)

NATIONAL ASSOCIATION OF CORROSION ENGINEERS (NACE)

NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION (NECA)

NATIONAL ELECTRICAL MANUFACTURERS ASSOCATION (NEMA)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

PEDERNALES ELECTRIC COOPERATIVE (PEC)

UNDERWRITERS' LABORATORIES, INC. (UL)

B. Reference to standards of any technical society, organization, or both shall be construed to mean the latest standard, code, or specification adopted and published at the date of advertisement.

C. All work shall be in accordance with approved conformed drawings, specifications and contract documents, NEC, TCEQ rules, AWWA standards, applicable federal, state and local laws, rules and regulations, and shall be in accordance with GBRA standards and design guidelines published on GBRA's developer resources web page. In the event of conflict among any such requirement, the most stringent requirement shall apply.

1.03 DESCRIPTION OF ELECTRICAL WORK

A. General Description:

1. The electrical work to be performed under the provisions of these Contract Documents consists of furnishing all materials, equipment, supplies, and appurtenances; providing all

construction plans, equipment and tools; performing all necessary labor and supervision, and the construction, complete including all work appurtenant thereto, at the following site: Ammann Road GBRA Delivery Point located in Boerne, TX.

B. Electrical work provided within this Contract:

1. Contractor is responsible for coordinating with Pedernales Electric Coop and providing all required service construction in accordance with the requirements and specifications of PEC.
2. Furnish and install equipment as indicated on the plans. Coordinate with Pedernales Electric Coop for inspections, cable connections and other required work.
3. Contractor to furnish and install Main Fused Disconnect Switch as shown in plans.
4. Contractor shall furnish and install the following equipment in the building:
    a. Power Panelboard. Section 26 05 00, BASIC ELECTRICAL MATERIALS AND METHODS.
    b. RTU Cabinet. Reference Division 40.
    c. Flowmeter and Display unit. Reference Division 40.
    d. Pressure Transmitter. Reference Division 40.
    e. Receptacles and Lighting. Refer to plans and Section 26 05 00, BASIC ELECTRICAL MATERIALS AND METHODS.
5. Furnish and install heat trace per contract drawings and per Section 26 94 00, INSTRUMENTATION HEAT TRACE SYSTEM.
6. Contractor shall provide Electrical Testing as per Section, 26 95 00, COMMISSIONING OF ELECTRICAL SYSTEMS.
7. Furnish and install grounding systems as shown on the Contract Drawings and specified in Section 26 45 10, Grounding.
8. The work shall include all duct banks, conduit, cable, wiring, interconnection, and grounding as specified herein, as indicated on the Contract Drawings and as necessary to provide a complete functional operating electrical system.
9. The CONTRACTOR is to provide the conduit layout drawings showing proposed routing of exposed conduits, conduits embedded in structural concrete and concrete-encased conduits. Drawings shall show locations of pull and junction boxes and all penetrations on walls and floor slabs. Conduit shall not be installed until approved by Owner and Engineer.
10. Contractor shall alert testing firm after panels and disconnects are installed and after distribution cables are installed and landed but not torqued in order for equipment and cable testing to be completed properly.
11. Furnish Operations and Maintenance Manuals for the following items of electrical equipment:
    a. Instrumentation.
    b. SCADA System Equipment.
    c. Panelboards.

d. Surge Protective Device.

e. Safety Switches – Heavy Duty.

1.04 SUBMITTALS

A. Shop Drawing and Material Specification Submittals: The submittal of Shop Drawings and material specifications in accordance with Division 26 and the General Conditions of the Contract, shall include the following:

1. Duct materials including conduit, fittings, and spacers.
2. All conductors and cables.
3. Panelboards.
4. Enclosures, light fixtures, and receptacles.
5. Instrumentation.
6. SCADA System equipment.
7. Surge Protective Device.
8. Safety Switches – Heavy Duty.

1.05 FINAL DRAWINGS

A. Final drawings shall be submitted in accordance with Division 1 and shall include:

1. Final "As-Built" Drawings:

a. The Contractor shall, prior to final acceptance, provide the Owner with one copy of the Contract Drawings indicating all deviations made, and additional information provided during construction and installation. The drawings shall be documentation of the entire station "as-built" by the Contractor and shall also indicate the following:

i. All fuse and breaker size

PART 2 PRODUCTS

2.01 GENERAL

A. All electrical materials used shall conform to the National Electric Code rules and shall be approved by the National Board of Fire Underwriters for the class of service for which they are intended and shall bear the label or approval of the Underwriters Laboratories insofar as such services are available.

B. Materials and equipment provided under these specifications shall be new products of manufacturers regularly engaged in production of such equipment. Provide the manufacturer's latest standard design for the type of equipment specified.

PART 3 EXECUTION

3.01 GENERAL

A. Electrical Drawings show general locations of equipment, devices, and raceway, unless specify dimensioned.

1. Dimensions shown on the Drawings related to equipment are based on one typical manufacturer's equipment. Coordinate the dimensions of the equipment furnished with the space available.

2. Intent:

   a. The drawings show the principal elements of the electrical system. They are not intended as detailed working drawings for the electrical work but as a complement to the specifications to clarify the principal features of the electrical systems.

   b. It is the intent of this Section that all equipment and devices, furnished and installed under this and other Sections, be properly connected and interconnected with other equipment so as to render the installations complete for successful operation, regardless of whether all the connections and interconnections are specifically mentioned in the specifications or shown on the drawings. Any work that may reasonably be inferred from the specifications or drawings as being required to provide the completed electrical systems shall be supplied whether or not it is specifically called for.

   c. Dielectric couplings shall be installed between dissimilar metals in all cases.

B. Install work in accordance with NECA Standard of Installation, unless otherwise specified.

C. All electrical work shall be installed per drawings and specifications, NEC, and GBRA standards design guidelines for customer water delivery points in the event of conflicts in the contract documents, the most stringent shall apply.

D. Installation and Operation:

1. Equipment shall not be installed or operated except by, or with the guidance of, qualified personnel having the knowledge and experience necessary for proper results. When so specified, or when employees of Contractor or his Subcontractors are not qualified, such personnel shall be field representatives of the manufacturer of the equipment or materials being installed.

2. All electrical work shall be performed by workers skilled in the electrical trade and licensed for the work by the local authority.

3. A licensed journeyman electrician will be required for constructing, installing, altering, maintaining, repairing or replacing any electrical wiring, apparatus, or equipment on any voltage level. A licensed master electrician or a licensed journeyman electrician is required to be on the job site during the performance of any electrical work.

4. Contractor shall field verify vertical and horizontal location of all existing utilities prior to ordering materials and prior to performing any work. Schedule GBRA to witness. Notify engineer of any discrepancies or conflicts.

5. Existing water and wastewater systems shall remain in service at all times during construction unless specifically approved otherwise by GBRA. Any work involving tie-ins, shutdowns, power outages, or any other interruptions, must be performed between 8:00am and 5:00pm excluding weekends and holidays, unless specifically approved otherwise by GBRA. All temporary power, bypass pumping, pump and haul, temporary plugs, etc., necessary to maintain system operations and accomplish the work, shall be furnished and performed by the contractor. Coordinate and schedule any such activities with GBRA at least ten (10) business days in advance.

3.02 LOAD BALANCE-NOT REQUIRED

3.03 CHECKOUT AND STARTUP

A. All equipment installed under this Contract shall be placed into successful operation according to the written instructions of the manufacturer or the instructions of the manufacturer's field representative. All required adjustments, tests, operation checks, and other startup activity shall be provided. All costs for these services by the manufacturer shall be included in the contract amount.

B. Voltage Field Test:

1. Check voltage at point of termination of power company supply system to project when installation is essentially complete and is in operation.

2. Check voltage amplitude and balance between phases for loaded and unloaded conditions.

3. Unbalance Corrections:

a. Make written request to power company to correct condition if balance (as defined by NEMA) exceeds 1 percent, or if voltage varies throughout the day and from loaded to unloaded condition more than plus or minus 4 percent of nominal.

b. Obtain a written certification from a responsible power company official that the voltage variations and unbalance are within their normal standards if corrections are not made.

END OF SECTION

SECTION 26 05 00
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 GENERAL

1.01 SUBMITTALS

A. Shop Drawings:
   1. Junction and pull boxes used at, or below, grade
   2. Device box
   3. Terminal junction boxes
   4. Panelboards and circuit breaker data
   5. Lighting fixtures
   6. Control cabinet enclosures
   7. Control cabinet wiring and terminal blocks
   8. Control cabinet devices and nameplates
   9. Devices

1.02 QUALITY ASSURANCE

A. UL Compliance: Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

1.03 SPARE PARTS

A. Furnish, tag, and box for shipment and storage and deliver prior to 75 percent Project completion the following spare parts:
   1. Fuses, 0 to 600 Volts: Six (6) of each type and each current rating installed unless otherwise specified.
   2. Lamps for panel lighting: Twelve of each type installed.
   3. One (1) circuit breaker of each type and size.
   4. Relays (30% of each type and size)
   5. Fuses (30% of each type and size)
   6. LED Lamps for push-to-test indicator lights (30% of each type)

PART 2 PRODUCTS

2.01 OUTLET AND DEVICE BOXES

A. Form 7 Sand-Cast Aluminum:
   1. Material: Sandcast Aluminum
   2. Cover: Sand cast aluminum cover with gasket, attach with 304SS screws. (Snap-on covers are not allowed)
   3. Finish: Natural Aluminum
   4. Manufacturers:
      a. Crouse-Hinds; Type FD
      b. Appleton; Type FD

2.02 JUNCTION AND PULL BOXES

A. Outlet Boxes Used as Junction or Pull Box: As specified under Article OUTLET AND DEVICE BOXES.

B. Large Stainless-Steel Box: NEMA 250, Type 4X.

1. Box: 16-gauge, Type 304 stainless-steel, with white enamel painted interior mounting panel, and 10 gauge 304 stainless-steel flanges.
2. Cover: Continuous hinge with lockable 3-Point Latch System. If 3-Point Latch is unavailable, enclosure shall have ¼ turn latches.
3. Hardware and Machine Screws: ASTM A167, Type 304 stainless-steel.
4. Manufacturers:
   a. Hoffman Enclosures Co.
   b. Rittal
5. Hubs: Grounding type aluminum Myers hub with insulated throat.
6. Lugs: Aluminum lay-in type grounding lugs.
7. Enclosure shall have 304SS non-removable external mounting lugs.

2.03 WIRING DEVICES

A. Switches:
   1. NEMA WD1 and FSW-S-896E.
   2. Specification grade, totally enclosed, ac type, with quiet tumbler switches and screw terminals.
   3. Capable of controlling 100 percent tungsten filament and fluorescent lamp loads.
   4. Rating: 20 amps, 120/277 volts
   5. Color: Ivory
   6. Manufacturers:
      a. Bryant
      b. Leviton
      c. Hubbell
      d. Pass and Seymour
      e. Arrow Hart

B. Receptacle, Duplex: (Panel Interior only)
   1. NEMA WD 1 and FS W-C-596.
   2. Specification grade, two-pole, three-wire grounding type with screw type wire terminals suitable for No. 10 AWG.
   3. High strength, thermoplastic base color.
   4. Color: Ivory.
   5. Contact Arrangement: Contact to be made on two sides of each inserted blade without detent.
   6. Rating: 125 volts, NEMA WD 1, Configuration 5-20R, 20 amps.
   7. Manufacturers:
      a. Bryant
      b. Leviton
      c. Hubbell
      d. Pass and Seymour
      e. Sierra
      f. Arrow Hart

C. Receptacle, Ground Fault Circuit Interrupter: Duplex, specification grade, tripping at 5 mA. Weather Resistant (WR) required for all.
   1. Color: Ivory.
   2. Rating: 125 volts, NEMA WD 1, Configuration 5-20R, 20 amps, capable of interrupting 5,000 amps without damage.
   3. Size: For 2-inch by 4-inch outlet boxes and aluminum FD boxes
   4. Wiring to be XHHW-2.

5. Manufacturers:
    a. Pass and Seymour
    b. Bryant
    c. Leviton
    d. Hubbell
    e. Arrow Hart

2.04 DEVICE PLATES

A. General: Sectional type plates not permitted.

B. Weatherproof:
    1. For Receptacles: Gasketed, cast aluminum or stainless-steel, with individual cap over each receptacle opening except for the receptacles located in enclosures
        a. Type: Shall be extra duty, "in-use" type suitable for wet locations as per NEC Article 406.9. Shall be weatherproof whether or not the attachment plug cap/cover is inserted/closed.
        b. Mounting Screw: Stainless-steel.
        c. Manufacturers:
            1) General Electric
            2) Bryant
            3) Hubbell
            4) Sierra
            5) Pass and Seymour
            6) Crouse-Hinds; Type WLRD or WLRS
            7) Bell
            8) Arrow Hart
            9) Appleton; FSK-W
    2. For Switches: Gasketed, cast aluminum incorporating external operator for internal switch.
        a. Mounting Screw: Stainless-steel
        b. Manufacturers:
            1) Crouse-Hinds; DS-181 or DS-185
            2) Appleton; FSK-1VTS or FSK-1VS

2.05 LIGHTING AND POWER DISTRIBUTION PANELBOARD, 240 VAC

A. NEMA PB, NFPA 70, and UL 67

B. Panelboards and Circuit Breakers: Suitable for use with 75° C wire at full NFPA 70, 75° C ampacity.

C. Short-Circuit Current Equipment Rating: Fully rated 10kA.

D. Rating: Applicable to a system with available short-circuit current of 10,000 amperes rms symmetrical.

E. Ground Fault Interrupter: 5-mA trip, 10,000 amps interrupting capacity circuit breakers.

F. Cabinet: NEMA Type 4X FRP

G. Bus Bar:
    1. Material: Tin-plated or silver plated copper full sized throughout length.
    2. Provide for mounting of future circuit breakers along full length of bus regardless of number of units and spaces shown. Machine, drill, and tap as required for current and future positions.

3. Neutral: Insulated, rated same as phase bus bars with at least one terminal screw for each circuit.
4. Ground: Copper, installed on panelboard frame, bonded to box, with at least one terminal screw for each circuit.
5. Lugs and Connection Points:
   a. Suitable for either copper or aluminum conductors.
   b. Solderless main lugs for main, neutral, and ground bus bars.
   c. Sub-feed or through-feed lugs as shown.
6. Bolt together and rigidly support bus bars and connection straps on molded Insulators.

H. Circuit Breakers
1. NEMA AB 1 and UL 489.
2. Thermal-magnetic, quick-make, quick-break, molded case, of the indicating type showing ON/OFF and TRIPPED positions of operating handle.
3. Noninterchangeable, in accordance with NFPA 70.
4. Type: Bolt-on circuit breakers in all panelboards. Minimum sized breakers shall be 20 Amp.
5. Multipole circuit breakers designed to automatically open all poles when an overload occurs on one pole.
6. Do not substitute single-pole circuit breakers with handle ties for multipole breakers.
7. Do not use tandem or dual circuit breakers in normal single-pole spaces.
8. Ground Fault Interrupter:
   a. Equip with conventional thermal-magnetic trip and ground fault sensor rated to trip in 0.025 second for a 5 milliampere ground fault (UL 943, Class A sensitivity).
   b. Sensor with same rating as circuit breaker and a push-to-test button.

I. Surge Protective Device:
1. Eaton Model SPD 250 240S 3 A or equal from panelboard manufacturer.
2. Integrated unit (not external).

J. Manufacturers:
1. Eaton
2. Siemens
3. General Electric
4. Square D

2.06 TERMINAL JUNCTION BOX

A. Junction boxes and cabinets within the electrical building shall be NEMA 4X FRP, continuous hinge (if available), lockable 3-point latch system, and non-removable external mounting lugs. Slotted 1/4 turn latches are acceptable if 3-point latches are not available. Any external metallic components or hardware shall be 304 stainless steel.

B. Terminal Blocks: Provide separate connection point for each conductor entering or leaving box.
1. Spare Terminal Points: 25 percent.

C. Interior Finish: Paint with white enamel or lacquer.

2.07 TERMINAL BLOCK (0 TO 600 VOLTS)

A. UL 486E and UL 1059.

B. Screw-type for accepting ring-tongue compression lugs.

C. Terminal blocks should be rated for applied voltage.

D. Clear safety cover provided to protect power distribution lugs.

E. Manufacturers:
   1. Buchanan
   2. General Electric

2.08 SUPPORT AND FRAMING CHANNELS

A. Material: All support and framing channels shall be 304 stainless steel.

B. Type: 1-1/2 minimum strut

C. Inserts: Continuous

D. Beam Clamps: Type 304 Stainless-Steel.

E. Manufacturers:
   1. B-Line
   2. Unistrut
   3. Kindorf

2.09 CONTROL CABINETS

A. All interior enclosures shall be NEMA Type 4, FRP.

B. All mounting hardware shall be 304 stainless steel.

C. All interior enclosures shall be equipped with non-removable mounting lugs.

D. Enclosures shall have a single swing panel front with continuous hinge, and shall have 3-point latch with provision for padlocking. Hinge pin and panel clamps shall be stainless-steel. Swing panel to be FRP dead front.

E. Provide slotted flush-mount ¼-turn latches and padlock staple for enclosures that are not available with a 3-point latch system. Mount all enclosures on vertical strut.

F. Enclosures shall have an interior back panel. No screws shall penetrate the enclosure. The interior surfaces shall be white baked enamel finish.

G. Control panels installed in indoor locations shall not have a dead front inner door. Control panels installed in outdoor locations shall have an aluminum dead front inner door. Do not mount any components on the exterior door of outdoor control panels.

H. Enclosures shall have LED strip lighting with door switch inside control panels if the enclosure size is greater than or equal to 30” wide and greater than or equal to 12” deep.

I. All control panels shall have a Hoffman type thermostatically controlled enclosure heater.

J. Install a white color duplex 110V 20A GFCI receptacle in each control panel.

K. Devices and nameplates shall be furnished and installed as indicated in the Contract Drawings.

L. Enclosure Manufacturers:
   1. Hoffman Enclosure Co.
   2. Rittal
   3. Eaton B-Line

M. Design and Assembly: Contractor to submit name and qualifications of design and assemble firm for Owner’s approval.

2.10 NAMEPLATES

A. All electrical enclosures shall be identified using black phenolic labels with white 3/8” block lettering.

B. Material: Laminated plastic

C. Attachment: Aluminum rivets or stainless-steel screws.

D. Color: Black, engraved to a white core

E. Engraving:
   1. Pushbuttons/Selector Switches: Name of drive controlled on one, two, or three lines, as required.
   2. Panelboards: Panelboard designation, service voltage, and phases.

F. Letter Height:
   1. Pushbuttons/Selector Switches: 1/8 inch.
   2. Panelboards: 3/8 inch.
   3. All components shall be labeled on the interior back panel using adhesive tape type labels with black machine printed 3/16" block lettering.

2.11 PUSHBUTTONS, INDICATING LIGHTS, AND SELECTOR SWITCHES

A. All pushbuttons, indicating lights and selector switches shall be NEMA rated. IEC-only rated equipment is not acceptable. Pushbuttons, indicating lights, and selector switches shall be installed on the aluminum dead front swing panel of panels installed in outdoor locations and shall be installed on the exterior door of panels installed in indoor locations.

B. Contact Rating: NEMA ICS 2, Type A600.

C. Selector Switch Operating Lever: Standard.

D. LED Indicating Lights: Heavy-duty, oiltight, 120V, push-to-test LED:
   1. Motor On – Red
   2. Motor Off – Green
   3. Fault – Amber
   4. Power On – White

E. Pushbutton Color:
   1. Red mushroom head without spring return for generator emergency stop only.

F. Manufacturers:
   1. Heavy-Duty, Oiltight Type:
      a. General Electric Type CR 104P.
      b. Square D Type K.
      c. Eaton Type 10250T.
      d. Allen-Bradley Type 800T.
   2. Heavy-Duty, Watertight, and Corrosion-Resistant Type:
      a. Square D Type SK.
      b. General Electric Type CR 104P.
      c. Eaton Type E34.

2.12 DC POWER SUPPLY (UPS)

A. RTU backup power system shall be a 24VDC battery system with a DIN rail mounted PSU and battery assembly.

B. RTU backup power system shall have sufficient capacity to power the RTU for a minimum of two (2) hour duration. The system shall consist of:
   1. Phoenix Contact QUINT4-UPS/24DC/24DC/10EIP – Uninterruptible Power Supply
   2. Phoenix Contact QUINT4-PS/1AC/24DC/10 – Power Supply

3. Phoenix Contact UPS-BAT/PB/24DC/4AH – Battery Module (Battery size should vary to meet a 2-hour uptime when running on battery power)

C. RTU backup power system UPS shall be included in site Ethernet network. Any data points made available by the UPS module shall be obtained via EtherNet/IP or Modbus TCP where available.

D. UL Compliance: Power Supply shall conform to UL Standards and have an applied UL listing.

E. Manufacturer:
1. Phoenix Contact

PART 3 EXECUTION

3.01 GENERAL

A. Install equipment in accordance with NECA 5055.

3.02 OUTLET AND DEVICE BOXES

A. Install suitable for conditions encountered at each outlet or device in the wiring or raceway system, sized to meet NFPA 70 requirements.

B. Install plumb and level.

C. Support boxes independently of conduit by attachment to building structure or structural member.

D. Support boxes utilizing external mounting lugs. Do not drill holes in boxes.

E. Box Type:
1. FRP

3.03 JUNCTION AND PULL BOXES

A. Install where shown and where necessary to terminate, tap-off, or redirect multiple conduit-runs.

B. Install pull boxes where necessary in raceway system to facilitate conductor installation.

C. Install in conduit runs at least every 150 feet or after the equivalent of three right-angle bends.

D. Use outlet boxes as junction and pull boxes wherever possible and allowed by applicable codes.

E. Installed boxes shall be accessible.

F. All enclosures shall be mounted on vertical strut.

G. Install plumb and level.

H. Support boxes independently of conduit by attachment to building structure or structural member.

I. At or Below Grade:
1. Install boxes for below grade conduits flush with finished grade in locations outside of paved areas, roadways, or walkways.
2. If adjacent structure is available, box may be mounted on structure surface just above finished grade in accessible but unobtrusive location.
3. Boxes shall not be installed in paved areas, roadways, or walkways.
4. Use boxes and covers suitable to support anticipated weights.

J. Mounting Hardware:
   1. All Areas: 304 stainless-steel.

K. Type:
   1. Outdoor: NEMA 4X, 304 stainless steel.
   2. Indoor: NEMA 4X, FRP.

3.04 WIRING DEVICES

A. Switches:
   1. Install with switch operation in vertical position.
   2. Install single-pole, switches such that toggle is in up position when switch is on.

B. Receptacles:
   1. Install with grounding slot up in vertical mounting, and with neutral slot up in horizontal mounting.
   2. Weatherproof Receptacles:
      a. Weather proof covers suitable for use in wet locations per NEC 406.9
      b. Type: “in-use”
      c. Install in FRP boxes.
      d. Install such that hinge for protective cover is above receptacle opening.
      e. Receptacle shall be Ground Fault Circuit Interrupter type GFCI-WR.
   3. Special-Purpose Receptacles: Install in accordance with manufacturer's instructions.

3.05 DEVICE PLATES

A. Securely fasten to wiring device; ensure a tight fit to the box.

B. Surface Mounted: Plate shall not extend beyond sides of box unless plates have no sharp corners or edges.

C. Install with alignment tolerance to box of 1/16 inch.

D. Types (Unless Otherwise Shown):
   1. Weatherproof.

E. Label circuit numbers on all device covers with white adhesive tape type labels with black machine printed 3/16” block lettering.

3.06 TERMINAL JUNCTION BOX

A. Label each block and terminal with permanently attached, non-destructible tag.

B. Do not install on finished outdoor surfaces.

C. Locations:
   1. Building interior: NEMA 250, Type 4X, FRP.
   2. Exterior: Type 4X, 304 stainless steel.

3.07 LIGHTING AND POWER DISTRIBUTION PANELBOARD

A. Install top of cabinet 6 feet above floor unless otherwise shown.

B. Provide typewritten circuit directory for each panelboard.

C. Provide clear vinyl adhesive-backed envelopes for panel directories.

3.08 SUPPORT AND FRAMING CHANNEL

A. File and de-burr all cut ends of strut and install plastic end protection cap.

B. Install where required for mounting and supporting electrical equipment and raceway systems.

C. All electrical enclosures, devices and light fixtures shall be mounted on strut.

D. All supports, channels and strut to be 304 stainless steel inside of building. Exterior shall be 304 stainless steel.

3.09 CONTROL CABINETS

A. Install securely, plumb, in-line and square with walls or structure.

B. Cabinets shall be mounted using manufacturer furnished mounting brackets so that no screws or bolts penetrate the cabinet.

C. Provide type written panel directories and laminated as-built schematics and diagrams in all electrical panels.

D. Provide plastic adhesive-backed pockets for schematics and diagrams.

END OF SECTION

SECTION 26 05 19
LOW – VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 CONTRACTOR TO USE GBRA STANDARDS FOR ALL CONDUCTORS

1.02 SUBMITTALS

A. Shop Drawings:
   1. Wire and cable descriptive product information.
   2. Wire and cable accessories descriptive product information.

B. Quality Control Submittals:
   1. Factory Test Report for conductors 600 volts and below.

1.03 UL COMPLIANCE

A. Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

PART 2 PRODUCTS

2.01 CONDUCTORS 600 VOLTS AND BELOW

A. Conform to applicable requirements of NEMA WC 3, WC 5, and WC 7.

B. Conductor Type: Stranded Copper

C. Insulation: Type XHHW-2 90ºC. Allowable conductor ampacity shall be as listed for 90ºC Temperature rating even for conductor with 90ºC rated insulation.
   1. Phase colored insulation is required for all conductors.
   2. Phase colored tape or heat shrink is not allowed.

2.02 600 VOLT RATED CABLE

A. General:
   1. Permanently and legibly marked with manufacturer's name, maximum working voltage for which cable was tested, type of cable, and UL listing mark.
   2. Suitable for installation in conduit.
   3. Minimum Temperature Rating: 90°C dry locations, 90°C wet locations.
   4. Overall Outer Jacket: XLPE, flame-retardant, sunlight-and oil-resistant.

B. Type 3-No. 20 AWG, Twisted, Shielded Pair, Instrumentation Cable: Single pair, designed for noise rejection for process control, computer, or data log applications meeting NEMA WC 55 requirements.
   1. Outer Jacket: 45 mil nominal thickness.
   2. Individual Pair Shield: Double-faced aluminum/synthetic polymer overlapped to provide 100 percent coverage.
   3. Conductors:
      a. Bare soft annealed copper, Class B, seven-strand concentric, meeting requirements of ASTM B8.
      b. 20 AWG, seven-strand tinned copper drain wire.
      c. Insulation: 15 mil nominal PVC.
      d. Jacket: 4 mil nominal nylon.

e. Color Code: Pair conductors red (positive) and black (negative).

4. Manufacturers:
   a. Okonite Co.
   b. Alpha Wire Corp.
   c. Belden

C. Twisted, Shielded Pair Instrumentation Cable for RS485 Applications (RS485 TW/SH)
1. Single pair.
2. Designed for noise rejection for Modbus RS485 applications.
3. Outer Jacket: PVC.
4. Individual Pair Shield: double-faced aluminum/synthetic polymer overlapped to provide 100 percent coverage. Tinned copper braid shield with 90% coverage.
5. Conductors:
   a. No. 24 AWG bare soft annealed copper, Class B, seven-strand concentric, meeting requirements of ASTM B8.
   b. 24 AWG, seven-strand tinned copper drain wire.
   c. Insulation: 23 mil nominal polyethylene.
   d. Jacket: 35 mil nominal PVC.
   e. Color Code: Pair conductors blue and white.
6. Standards:
   a. UL 1685
   b. When installed in cable trays shall be cable tray rated (Type TC).
   c. NEMA WC 55
7. Manufacturers:
   a. Belden type 9841 or equal from below manufacturers:
   b. AlphaWire
   c. Okonite

D. Control panel and MCC control wiring: Flexible 41 strand tinned copper 600V insulation, minimum 14 AWG.
1. Type SIS for control panels
2. Type MTW for MCC's

2.03 GROUNDING CONDUCTORS

A. Equipment:
1. No. 6 AWG and Larger: Stranded Bare Copper, Class B stranding, soft-drawn.
2. No. 8 AWG and smaller: Copper, or Stranded copper with green, Type XHHW-2. Do not install bare copper conductors in the same conduit with insulated conductors.

B. Direct Buried: Stranded bare copper, class B stranding soft drawn.

2.04 ACCESSORIES FOR CONDUCTORS 600 VOLTS AND BELOW

A. Tape:
1. General Purpose, Flame-Retardant: 7 mil, vinyl plastic, Scotch Brand 33, rated for 90°C minimum, meeting requirements of UL 510.
2. Flame Retardant, Cold and Weather Resistant: 8.5 mil, vinyl plastic, Scotch Brand 88.
3. Arc and Fireproofing:
   a. 30 mil, elastomer
   b. Manufacturers and Products:
      1) Scotch; Brand 77, with Scotch Brand 69-glass cloth tapebinder.
      2) Plymouth; Plyarc 30, with Plymouth Plyglas glass cloth tapebinder

B. Identification Devices:
   1. Sleeve: Permanent, PVC, yellow or white, with legible machine-printed black markings.
      a. Heat shrink type is required.
      b. Manufacturers and Products before Permanent:
         1) Panduit
         2) Raychem
   2. Grounding Conductor: Color coded insulation required for all sizes

C. Connectors and Terminations:
   1. Nylon, Self-Insulated Crimp Connectors:
      a. Manufacturers and Products:
         1) Thomas & Betts; Sta-Kon
         2) Burndy; Insulink
         3) ILSCO
   2. Nylon, Self-Insulated, Crimp Locking-Fork, Torque-Type Terminator:
      a. Manufacturers and Products:
         1) Thomas & Betts; Sta-Kon
         2) Burndy; Insulink
         3) ILSCO
   3. Self-Insulated, Freespring Wire Connector (Wire Nuts):
      a. Plated steel, square wire springs.
      b. UL Standard 486C.
      c. Manufacturers and Product:
         1) Thomas & Betts
         2) Ideal; Twister

D. Cable Lugs:
   1. In accordance with NEMA CC 1.
   2. Rated 600 volts of same material as conductor metal.
   3. Insulated, Locking-Fork, Compression Lugs:
      a. Suitable for use with 75°C wire at full NFPA 70, 75°C ampacity.
      b. Manufacturers and Products:
         1) Thomas & Betts; Sta-Kon
         2) ILSCO; ILSCONS
   4. Uninsulated Crimp Connectors and Terminators:
      a. Suitable for use with 75°C wire at full NFPA 70, 75°C ampacity. Manufacturers and Products:
         1) Square D; Versitide
         2) Thomas & Betts; Color-Keyed
         3) ILSCO
   5. Uninsulated, Bolted, Two-Way Connectors and Terminators:
      a. Manufacturers and Products:
         1) Thomas & Betts; Locktite
         2) Burndy; Qiklug
         3) ILSCO

E. Cable Ties: Black only Nylon, adjustable, self-locking, and reusable.
   1. Manufacturer and Product: Thomas & Betts; TY-RAP.

2.05 PULLING COMPOUND

A. Nontoxic, noncorrosive, noncombustible, nonflammable, clear, non-staining, polymer-based lubricant; UL listed.

B. Suitable for rubber, neoprene, PVC, polyethylene, hypalon, CPE, and lead-covered wire and cable.

C. Suitable for zinc-coated steel, aluminum, PVC, bituminized fiber, and fiberglass raceways.

D. Manufacturers and Products:
   1. 3M.
   2. Greenlee.
   3. Ideal ClearGlide.

2.06 SOURCE QUALITY CONTROL

A. Conductors 600 Volts and below: Test in accordance with UL 44 and 854 Standards.

PART 3 EXECUTION

3.01 GENERAL

A. Conductor installation to be in accordance with NECA 5055.

B. Conductor and cable sizing shown is based on copper conductors, unless noted otherwise.

C. Do not exceed cable manufacturer's recommendations for maximum pulling tensions and minimum bending radius.

D. Tighten screws and terminal bolts in accordance with UL 486A for copper conductors.

E. Cable Lugs: Provide with correct number of holes, bolt size, and center-to-center spacing as required by equipment terminals.

F. Bundling: Where single conductors and cables in manholes, handholes, vaults, cable trays, and other indicated locations are not wrapped together by some other means, bundle conductors from each conduit throughout their exposed length with cable ties placed at intervals not exceeding 18 inches on center.

G. Label each group of conductors inside vaults, pull boxes, junction boxes, manholes, and handholes. Labels shall be black phenolic tags with white 3/16” block lettering to include the group designation, origin, and destination.

H. Ream, remove burrs, and clear interior of installed conduit before pulling wires or cables.

I. Concrete-Encased Raceway Installation: Prior to installation of conductors, perform mandrel testing of all underground conduits including stub-ups. Mandrel diameter shall not be less than 80% of conduit inside diameter. Mandrel shall be Condux Short Rubber Slug or approve equal.

3.02 POWER CONDUCTOR COLOR CODING

A. Conductors 600 Volts and Below
   1. Colored insulation required (Phase Tape is not allowed).
   2. Colors:

System	Conductor	Color
All Systems	Equipment Grounding	Green
240/120 Volts Single-Phase, Three-Wire	Grounded Neutral One Hot Leg Other Hot Leg	White Black Red

System	Conductor	Color
208Y/120 Volts Three-Phase, Four-Wire	Grounded Neutral Phase A Phase B Phase C	White Black Red Blue
480Y/277 Volts Three-Phase, Four-Wire	Grounded Neutral Phase A Phase B Phase C	Gray Purple Brown Yellow
NOTE: Phase A, B, C implies direction of positive phase rotation.		
Contractor to use phase color per PEC and GBRA Standards.		

3. 24 Volt DC Positive-Blue
4. 24 Volt DC returns-White with blue tracer
5. 4-20 TSP Red+/Black-
6. Tracer: Outer covering of white with an identifiable colored strip other than green in accordance with NFPA 70.
7. Control Panel wiring:
   a. AC controls – Red
   b. DC controls – Blue
   c. DC(+) Power – Red
   d. DC(-) Power – Black
   e. AC hot – Black with red tracer
   f. AC neutral - White

3.03 CIRCUIT IDENTIFICATION

A. Circuits appearing in the Circuit Schedules: Identify power, instrumentation, and control conductor circuits, using circuit schedule designations, at each termination and in accessible locations such as manholes, handholes, panels, switchboards, motor control centers, pull boxes, and terminal boxes.

B. Circuits Not Appearing in Circuit Schedules:
   1. Assign circuit name based on device or equipment at each end of circuit.
   2. Where this would result in same name being assigned to more than one circuit, add number or letter to each otherwise identical circuit name to make it unique.

C. Method:
   1. Identify all conductor sizes with yellow or white heat shrink type labels with black machine printing.
   2. Taped-on markers or tags relying on adhesives not permitted.
   3. Label each end of all conductors. All printing shall face the panel door and must be visible and unobstructed. Print orientation shall be left to right for horizontal conductors. Print orientation shall be bottom to top for vertical conductors. Printing shall include origin and destination, and equipment and termination for each. Edge of labels shall be ¼" from end of insulation unless such placement will obstruct visibility.

3.04 CONDUCTORS 600 VOLTS AND BELOW

A. Install 10 AWG or 12 AWG stranded conductors for branch circuit power wiring in lighting and receptacle circuits.

B. Splicing of conductors is not allowed. Terminations shall be made utilizing terminal strips mounted on a backplane. All components shall be labeled on the backplane with white adhesive tape type labels with black machine printed 3/16" block lettering.

C. Connections and Terminations:
   1. Install wire nuts only on stranded conductors.
   2. Install nylon self-insulated crimp connectors and terminators for instrumentation, control, and power circuit conductors No. 6 AWG and smaller.
   3. Install uninsulated crimp connectors and terminators for instrumentation, control, and power circuit conductors No. 4 AWG through No. 2/0 AWG.
   4. Install uninsulated, bolted, two-way connectors and terminators for power circuit conductors No. 3/0 AWG and larger.
   5. Install uninsulated bolted, two-way connectors for motor circuit conductors No. 12 and larger.
   6. Tape insulate all uninsulated connections.
   7. Place no more than one conductor in any single-barrel pressure connection.
   8. Install crimp connectors with tools approved by connector manufacturer.
   9. Install terminals and connectors acceptable for type of material used.
   10. Compression Lugs:
      a. Attach with a tool specifically designed for purpose.
      b. Tool shall provide complete, controlled crimp and shall not release until crimp is complete.
      c. Do not use plier type crimpers.

D. Do not use soldered mechanical joints.

E. Splices and Terminations:
   1. Splicing of conductors is not allowed. Terminations shall be made utilizing terminal strips mounted on a backplane. All components shall be labeled on the backplane with white adhesive tape type labels with black machine printed 3/16" block lettering.

F. Cap spare conductors and conductors with UL listed end caps.

G. Identify the opposing ends of spare conductors using yellow heat shrink type markers with black machine printing. Labels shall be Raychem or Panduit.

H. Cabinets, Panels, and Motor Control Centers:
   1. Remove surplus wire, bridle and secure.
   2. Where conductors pass through openings or over edges in sheet metal, remove burrs, chamfer edges, and install bushings and protective strips of insulating material to protect the conductors.

I. Control and Instrumentation Wiring:
   1. Where terminals provided will accept such lugs, terminate control and instrumentation wiring, except solid thermocouple leads, with insulated, locking-fork compression lugs.
   2. Terminate with methods consistent with terminals provided, and in accordance with terminal manufacturer's instructions.
   3. Locate splices in readily accessible cabinets or junction boxes using terminal strips.
   4. Cable Protection:
      a. Maintain integrity of shielding of instrumentation cables.

b. Ensure grounds do not occur because of damage to jacket over the shield.

J. Extra Conductor Length: For conductors to be connected by others, install minimum 6 feet of extra conductor in freestanding panels and minimum 2 feet in other assemblies.

3.05 FIELD QUALITY CONTROL

A. In accordance with Section 26 95 00, COMMISSIONING OF ELECTRICAL SYSTEMS.

END OF SECTION

SECTION 26 05 20
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Hangers and supports for electrical equipment and systems.
   2. Construction requirements for concrete bases.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
      a. Hangers
      b. Steel slotted support systems
      c. Clamps
      d. Sockets
      e. Eye nuts
      f. Brackets

B. Shop Drawings: For fabrication and installation details for electrical hangers and support systems.
   1. Steel slotted-channel systems
   2. Equipment supports

PART 2 PRODUCTS

2.01 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4 factory-fabricated components for field assembly.
   1. Manufacturers:
      a. B-Line
      b. Unistrut
   2. Material: Stainless-steel, Type 304.
   3. Channel Width: 1-1/2 inches.
   4. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
   5. Channel Dimensions: Selected for applicable load criteria.

B. Conduit and Cable Support Devices: 304 Stainless-steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

C. Mounting, Anchoring, and Attachment Components: Refer to structural drawings for components.

2.02 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

PART 3 EXECUTION

3.01 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems unless requirements in this Section are stricter.

B. Comply with requirements for raceways and boxes specified in Sections 26 05 00 and 26 11 00.

3.02 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

B. Raceway Support Methods: In addition to methods described in NECA 1, RMCs may be supported by openings through structure members, according to NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code or by Structural plans:
   1. To New Concrete: Bolt to concrete inserts.
   2. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
   3. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69 or Spring-tension clamps.
   4. Field apply nickel anti-seize compound to threads prior to assembly.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.03 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

3.04 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 033000 Cast-in-Place Concrete.

C. Anchor equipment to concrete base as follows:

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.05 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
   1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780. Galvanizing repairs shall be minimum two (2) brush coats of ZRC Galvilite.

END OF SECTION

SECTION 26 11 00
RACEWAYS

PART 1 GENERAL

1.01 SUBMITTALS

A. Shop Drawings:
   1. Manufacturer's Literature:
      a. Rigid aluminum
      b. PVC Schedule 40 conduit
      c. PVC Schedule 80 conduit
      d. Flexible metal, liquid-tight conduit (Aluminum Core)
      e. Flexible, nonmetallic, liquid-tight conduit
      f. PVC – coated rigid galvanized steel conduit
      g. Conduit fittings
      h. Wireways
      i. Manholes and Handholes

1.02 UL COMPLIANCE

A. Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

PART 2 PRODUCTS

2.01 CONDUIT AND TUBING

A. Aluminum Rigid Metallic Conduit
   1. Meet requirements of UL 6A and ANSI C80.5.
   2. Type: Rigid aluminum.
   3. Use PVC-Coated Rigid Galvanized Steel when installed in soil or concrete. Refer to plans.
   4. Manufacturers:
      a. Allied Tube & Conduit
      b. Cantex

B. PVC Schedule 40 Conduit:
   1. Meet requirements of NEMA TC 2 and UL 651.
   2. UL listed for concrete encasement, underground direct burial, concealed or direct sunlight exposure, and 90° C insulated conductors.

C. Flexible Metal, Liquid-Tight Conduit:
   1. UL 360 listed for 105° C insulated conductors.
   2. Material: Aluminum, with an extruded PVC jacket.

D. Flexible, Nonmetallic, Liquid-Tight Conduit:
   1. Material: PVC core with fused flexible PVC jacket.
   2. UL 1660 listed for:
      a. Dry Conditions: 80° C insulated conductors.
      b. Wet Conditions: 60° C insulated conductors.
   3. Manufacturers:
      a. Carlon; Carflex or X Flex
      b. T & B; Xtraflex LTC or EFC

E. PVC – Coated Galvanized Rigid Steel Conduit:
   1. Meet requirements of UL 6A and ANSI C80.5.
   2. PVC Coated RGS conduit shall be ETL PVC-001 Certified.
   3. Type: Rigid Galvanized Steel, PVC externally coated by conduit manufacturer.
   4. Urethane-Coated threads.
   5. Coating shall be continuous and uniform.
      a. Exterior: 40-mil PVC
      b. Interior: 2-mil urethane
   6. Manufacturer:
      a. Robroy Industries.

2.02 FITTINGS

A. Aluminum:
   1. General:
      a. Meet requirements of UL 514B.
      b. Type: Threaded. Set screw fittings not permitted.
   2. Bushing:
      a. Material: Aluminum with integral insulated throat, rated for 150° C.
      b. Manufacturers:
         1) Thomas & Betts
         2) O.Z. Gedney
   3. Grounding Bushing:
      a. Material: Aluminum with integral insulated throat rated for 150 degrees C, with solderless lugs.
      b. Manufacturers:
         1) Appleton
         2) O.Z. Gedney
   4. Conduit Hub:
      a. Material: Aluminum with insulated throat.
      b. Conduit Hubs shall be grounding type.
      c. Manufacturers:
         1) O.Z. Gedney
         2) T & B
   5. Conduit Bodies:
      a. Material: Form 7 Sand Cast Aluminum, sized as required by NFPA 70.
      b. Manufacturers (For Normal Conditions):
         1) Appleton; Form 35 threaded Unilets
         2) Crouse-Hinds; Form 7 threaded condulets
      c. Conduit body covers shall be Aluminum with 304 stainless steel screws. Snap-on covers are not permitted.
   6. Couplings: As supplied by conduit manufacturer.
   7. All fittings shall be Aluminum or 304 Stainless-steel.
   8. Unions: Aluminum UNF or UNY. (Galvanized unions are not allowed)
   9. Drain Seal Manufacturers:
      a. Appleton; Type SF
      b. Crouse-Hinds; Type EYD or EZD
   10. Drain/Breather Fitting Manufacturers:
      a. Appleton; Type ECDB
      b. Crouse-Hinds; ECD
   11. Expansion Fitting Manufacturers:

a. Deflection/Expansion Movement:
    1) Appleton; Type DF
    2) Crouse-Hinds; Type XD
b. Expansion Movement Only:
    1) Appleton; Type XJ
    2) Crouse-Hinds; Type XJ

12. Cable Sealing Fittings:
    a. To form watertight nonslip cord or cable connection to conduit
    b. All fittings shall be Aluminum or 304 Stainless-steel.
    c. For Conductors with OD of 1/2 inch or less: Neoprene bushing at connector entry
    d. Manufacturers:
        1) Crouse-Hinds
        2) Appleton
13. Wall Mounted Conduit Support:
    a. 1 ½" x 1 ½" 304 stainless-steel channel
    b. 304 Stainless-steel conduit straps and hardware
    c. Manufacturer:
        1) Thomas and Betts/Kindorf

B. PVC Conduit and Tubing:
    1. Meet requirements of NEMA TC 3
    2. Type: PVC, slip-on

C. Flexible Metal, Liquid-Tight Conduit: (Aluminum Core)
    1. Connectors shall be aluminum.
    2. Aluminum Type insulated throat connectors with integral nylon or plastic bushing rated for 105° C.
    3. Insulated throat and sealing O-rings.
    4. Long design type extending outside of box or other device at least 2 inches.

D. Flexible, Nonmetallic, Liquid-Tight Conduit: Meet requirements of UL 514B.
    1. Type: One-piece fitting body, complete with lock nut, O ring, threaded ferrule, sealing ring, and compression nut. Connectors shall be nylon type.
    2. Manufacturers:
        a. Carlon
        b. Kellems
        c. T & B

E. PVC – Coated:
    1. Material: 40-mil PVC coated aluminum; Interior, 2-mil urethane
    2. Manufacturers:
        a. Robroy Industries

F. Watertight Entrance Seal Device:
    1. New Construction:
        a. Material: Oversized sleeve, malleable iron body with sealing ring, pressure ring, grommet seal, and pressure clamp.
        b. Manufacturer: O.Z. Gedney; Type FSK or WSK, as required.
    2. Cored-Hole Application:
        a. Material: Assembled dual pressure disks, neoprene sealing ring, and membrane clamp.
        b. Manufacturer: O.Z. Gedney; Series CSM.

2.03 MANHOLES AND HANDHOLES

A. Concrete Strength: Minimum, 3,000 psi compressive, in 28 days.

B. Loading: AASHTO Division 1, H 20 in accordance with ASTM C857.

C. Drainage:
   1. Slope floors toward drain points, leaving no pockets or other nondraining areas.

D. Raceway Entrances:
   1. Provide on all four sides.
   2. For raceways to be installed under this Contract provide knockout panels or precast individual raceway openings.
   3. At entrances where raceways are to be installed by others, provide minimum 12 inch high by 24-inch-wide knockout panels for future raceway installation.

E. Hardware: Steel, hot-dip galvanized, with porcelain cable support insulators.

F. Furnish knockout for ground rod in each handhole and manhole.

G. Manufacturers:
   1. Brooks Products, Inc.
   2. Penn-Cast Products, Inc.
   3. Concrete Conduit Co.
   4. Associated Concrete Products, Inc.
   5. Utility Vault Co.
   6. Pipe, Inc.

2.04 ACCESSORIES

A. Duct Bank Spacers:
   1. Type: Nonmetallic, interlocking, for multiple conduit sizes.
   2. Suitable for all types of conduit.
   3. Manufacturer: Underground Device, Inc.

B. Identification Devices:
   1. Raceway Tags:
      a. Material: Black Phenolic.
      b. Shape: Round.
      c. Raceway Designation: White ¼" block lettering.
      d. Tags relying on adhesives or taped-on markers not permitted.
   2. Warning Tape:
      a. Material: Polyethylene, 4 mil gauge
      b. Color: Red
      c. Width: Minimum 6 inch
      d. Designation: Warning on tape that electric circuit is located below tape.
      e. Warning tape shall be metallic detectable type.
      f. Manufacturers:
         1) Blackburn, Type RT
         2) Griffolyn Co.

C. Raceway Coating:
   1. Material: Plastibond by Robroy Industries touchup compound and touchup spray shall be used to repair cuts and abrasions to PVC coated galvanized rigid steel conduits.

PART 3 EXECUTION

3.01 GENERAL

A. Conduit and Tubing sizes shown are based on the use of copper conductors.

B. All installed Work shall comply with NECA 5055 and NFPA 70.

C. Crushed or deformed raceways not permitted.

D. Maintain raceway entirely free of obstructions and moisture.

E. Immediately after installation, plug or cap raceway ends with watertight and dust-tight seals until time for pulling in conductors.

F. Group raceways installed in same area.

G. Proximity to Heated Piping: Install raceways minimum 12 inches from parallel runs.

H. Follow structural surface contours when installing exposed raceways. Avoid obstruction of passageways.

I. Run exposed raceways parallel or perpendicular to walls, structural members, or intersections of vertical planes. Do not install raceways within walls.

J. Block Walls: Do not install raceways in same horizontal course with reinforcing steel.

K. Install watertight fittings in outdoor, underground, or wet locations.

L. Spray threads with de-greasing spray and apply thread compound (Kopr-Kote) to all field threaded PVC coated RGS conduit prior to installation. Apply Ilsco de-ox oxide inhibitor to all aluminum conduit threads prior to installation.

M. All metal conduit to be reamed, burrs removed, and cleaned before installation of conductors, wires, or cables.

N. All conduit shall be mounted on strut and secured in accordance with the NEC.

O. Install concealed, embedded, and buried raceways so that they emerge at right angles to surface and have no curved portion exposed.

3.02 INSTALLATION IN CAST-IN-PLACE STRUCTURAL CONCRETE

A. Minimum cover 3 inches.

B. Provide support during placement of concrete to ensure raceways remain in position.

C. Floor Slabs:
   1. Outside diameter of conduit not to exceed one-third of the slab thickness.
   2. Separate conduit by minimum six times conduit outside diameter, except at crossings.

3.03 CONDUIT APPLICATION

A. Maintain a minimum of 10 feet horizontal and 12 inches vertical clearance between electrical and other utilities. Shared trenches are not allowed.

B. All work must be inspected and approved by GBRA prior to backfilling, closing walls or forms, placing concrete, or otherwise covering the work. This includes crossings by other utilities. Any work that is covered prior to inspection and approval must be uncovered. GBRA will perform a maximum of one (1) inspection daily for one (1) hour duration between 8:00am and 5:00pm excluding weekends and holidays. Advance notice of two (2) business days (48 hours) is required for all inspections. Contractor shall utilize SharePoint to submit all requests for inspections. SharePoint instructions will be provided by GBRA. Contractor shall provide safe access to the work for inspector. Contractor shall provide assistance for inspector to verify lines and grades. Photos will not be accepted as substitute for inspections.

C. Diameter: Minimum 3/4 inch.

D. Exterior Exposed: aluminum conduit.

E. Interior Exposed:
   1. 18" or longer: rigid aluminum conduit.
   2. Less than 18" in length:
      a. 3/4" to 2" diameter: LFNC flexible seal tight conduit
      b. 2 1/2" or greater diameter: aluminum core liquid tight flexible metal conduit

F. Concrete-Encased Raceways: PVC Schedule 40. Minimum diameter is 1".

G. Transition: PVC coated RGS conduit is only required for transition from underground ductbank to exposed 6" above grade.

3.04 CONNECTIONS

A. For motors, wall or ceiling mounted fans and unit heaters, dry type transformers, electrically operated valves, instrumentation, and other equipment where flexible connection is required to minimize vibration:
   1. Use liquid-tight flexible non-metallic type LFNC-B conduit for 3/4" to 2" sizes (1/2" LFNC will be allowed for instruments with 1/2" threaded hub entries. All other flex shall be 3/4" or larger). LFNC connectors shall be nylon and UL listed.
   2. Use aluminum core liquid-tight flexible metal conduit for sizes 2-1/2" and larger. LFMC connectors shall be aluminum.
   3. Corrosive Areas: Flexible, nonmetallic, liquid or PVC-coated metallic, liquid-tight.
   4. Length: 18 inch maximum, of sufficient length to allow movement or adjustment of equipment.
   5. All conduit shall be mounted on strut and secured in accordance with the NEC.

B. Outdoor Areas, Process Areas Exposed to Moisture, and Areas required to be Oiltight and Dust-Tight: Flexible metal, liquid-tight conduit.

C. Transition From Underground Concrete Embedded to Exposed: Transition from PVC to PVC coated rigid galvanized steel shall occur prior to the final 90° turn out of the ground.

D. Exterior Light Pole Foundations: PVC Schedule 80 conduit.

3.05 PENETRATIONS

A. Make at right angles, unless otherwise shown.

B. Notching or penetration of structural members, including footings and beams, not permitted.

C. Concrete Walls, Floors, or Ceilings (Aboveground): Provide non-shrink grout dry-pack, or use watertight seal device.

D. Entering Structures:

1. Handholes:
    a. Nonmetallic Raceways: Provide bell ends flush with wall.

3.06 SUPPORT

A. Support from structural members only, at intervals not exceeding NFPA 70 requirements, and in any case not exceeding 10 feet. Do not support from piping, pipe supports, or other raceways.

B. Multiple Adjacent Raceways: Provide ceiling trapeze.

C. Provide and attach wall brackets, strap hangers, or ceiling trapeze as follows:
    1. Wood: Wood screws.
    2. Hollow Masonry Units: Toggle bolts.
    3. Concrete or Brick: Expansion shields, or threaded studs driven in by powder charge, with lock washers and nuts.
    4. Steelwork: Machine screws.

D. Nails or wooden plugs inserted in concrete or masonry for attaching raceway not permitted. Do not weld raceways or pipe straps to steel structures. Do not use wire in lieu of straps or hangers.

3.07 BENDS

A. Install no more than the equivalent of three 90° bends in any conduit run.

B. Install concealed raceways with a minimum of bends in the shortest practical distance.

C. Make bends and offsets of longest practical radius.

D. Install with symmetrical bends or cast metal fittings.

E. Field bending of conduit shall be accomplished using the appropriate tools. Flame bending is not allowed.

F. Make bends in parallel or banked runs from same center or centerline with same radius so that bends are parallel.

G. Factory elbows may be installed in parallel or banked raceways if there is change in plane of run, and raceways are same size.

H. PVC Conduit:
    1. Bends 30 Degree and Larger: Provide factory-made elbows.
    2. Use manufacturer's recommended method for forming smaller bends.

I. Flexible Conduit: Do not make bends that exceed allowable conductor bending radius of cable to be installed or that significantly restricts conduit flexibility.

3.08 EXPANSION/DEFLECTION FITTINGS

A. Provide on all raceways at all structural expansion joints, and in long tangential runs.

B. Provide expansion/deflection joints for 50° F maximum temperature variation.

C. Install in accordance with manufacturer's instructions.

3.09 PVC CONDUIT

A. Solvent Welding:
    1. Provide manufacturer recommended solvent; apply to all joints.
    2. Install such that joint is watertight.

B. Adapters:
    1. PVC to Metallic Fittings: PVC terminal type.

2. PVC to Rigid Metal Conduit or IMC: PVC female adapter.

C. Belled-End Conduit: Bevel the unbelled end of the joint prior to joining.

3.10 TERMINATION AT ENCLOSURES

A. Motor Control Center, Switchboard, Switchgear, and Free-Standing Enclosures: Terminate conduit-entering bottom with grounding bushing; provide a grounding jumper extending to equipment ground bus or grounding pad.

B. Install aluminum grounding type Myers hubs with insulated throats for all conduit penetrations into enclosures.

3.11 UNDERGROUND RACEWAYS

A. All underground conduit shall be concrete encased with steel reinforcing with a minimum of 3 inches of concrete over steel reinforcing as indicated on drawings.

B. Grade: Maintain minimum grade of 4 inches in 100 feet, either from one manhole, handhole, or pull box to the next, or from a high point between them, depending on surface contour.

C. Cover: Maintain minimum 2-foot cover above concrete encasement, unless otherwise shown.

D. Make routing changes as necessary to avoid obstructions or conflicts.

E. Couplings: In multiple conduit-runs, stagger so that couplings in adjacent runs are not in same transverse line.

F. Conduits shall have end bells where terminated at walls and adapters for steel conduit continuations.

G. Union type fittings not permitted.

H. Spacers:
1. Provide preformed, nonmetallic spacers, designed for such purpose, to secure and separate parallel conduit runs in concrete encasement.
2. Install at intervals not greater than that specified in NFPA 70 for support of the type conduit used, but in no case greater than 5 feet.

I. Support conduit so as to prevent bending or displacement during concrete placement.

J. Installation with Other Piping Systems:
1. Crossings: Maintain minimum 12-inch vertical separation.
2. Parallel Runs: Maintain minimum 12-inch separation.
3. Installation over valves or couplings not permitted.

K. Concrete Encasement: Class “A” (3000-PSI) concrete.

L. Backfill:
1. Process excavated material to meet specified soil fill requirements. Adjust moisture as necessary to obtain specified compaction. Place and compact backfill in 8 inch loose lifts. Backfill to grade with allowances for topsoil, crushed rock surfacing, pavements, or other work.
2. Do not backfill until inspected by OWNER.

M. Cutting and Patching of Asphalt Surfaces:

1. Contractor shall, in all areas to be paved, remove all recent fill or otherwise loose and uncompacted soil. The Contractor shall wet and compact this cut to 90% Texas Department of Transportation (TxDOT) Item 113E density. The Contractor shall place approved earth fill in 8-inch layers and compact soil to 95% modified SDH&PT Item 113 E density. The flexible base shall conform to the TDH&PT Item 248 Type A, Grade 1 and be six inches in thickness. The prime coat shall conform to SDH&PT Specifications Item 300.2 and be applied to the completed base coat at the rate of 0.15 gallons per square yard per Specification Item 340.6. A minimum of 2 inches hot mix asphaltic concrete (HMAC) meeting the requirements of TxDOT Item 340, using Type D mix, shall be placed. A crushed stone aggregate shall be included in the HMAC. The HMAC shall have a field density between 95% and 99% of the laboratory maximum density; the HVEEN stability shall be a 40 minimum. The Contractor shall replace the pavement at the existing grades.

3.12 MANHOLES AND HANDHOLES

A. Excavate, shore, brace, backfill, and final grade in accordance with applicable provisions of GBRA Standards.

B. Do not install until final raceway grading has been determined.

C. Install such that raceways enter at nearly right angles and as near as possible to one end of wall, unless otherwise shown.

D. Grounding: As specified in Section 264510, GROUNDING.

E. Identification: Field stamp covers with manhole or handhole number as shown. Stamped numbers to be 1-inch minimum height.

3.13 EMPTY RACEWAYS

A. Provide permanent, removable cap over each end.

B. Provide PVC plug with pull-tab for underground raceways with end bells.

C. Install pull tape rated for 1,250 lbs. in all spare conduits. Splices are not allowed.

D. Pull tape shall be wrapped and tied around outside of conduit at each end.

E. Aluminum coupling with threaded aluminum plug for metallic conduits, and PVC cap for PVC conduits.

F. Identify, as specified in Article IDENTIFICATION DEVICES, with waterproof tags attached to pull cord at each end, and at intermediate pull point.

3.14 IDENTIFICATION DEVICES

A. Raceway Tags:
   1. Identify origin and destination.
   2. Install at each terminus.
   3. Provide stainless steel wire for attachment.

B. Warning Tape: Install approximately 10 inches above underground concrete-encased raceways. Align parallel to, and above centerline of runs.

C. Buried Raceway Markers:
   1. Install at grade to indicate direction of underground raceways.
   2. Install at all bends and at intervals not exceeding 100 feet in straight runs.
   3. Embed and secure to top of concrete base, sized 14 inches long, 6 inches wide, and 8 inches deep; top set flush with finished grade.

3.15 PROTECTION OF INSTALLED WORK

A. Protect products from effects of moisture, corrosion, and physical damage during construction.

B. Provide and maintain manufactured watertight and dust-tight seals over all conduit openings during construction.

C. Touch up painted conduit threads after assembly to cover nicks or scars.

D. Touch up damage to coating on PVC-coated conduit with patching compound approved by manufacturer.

END OF SECTION

SECTION 26 41 00
SAFETY SWITCHES – HEAVY DUTY

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall furnish and install the low-voltage fused switches as specified herein and as shown on the contract drawings. Where applicable they shall be suitable for service on a 240V single phase solidly grounded system.

1.02 SUBMITTALS

A. Shop Drawings:
   1. Dimensioned outline drawing
   2. Conduit entry/exit locations
   3. Switch ratings including:
      a. Short-circuit rating
      b. Voltage
      c. Continuous current
   4. Cable terminal sizes

B. Product Information:
   1. Descriptive bulletins
   2. Product sheets.

1.03 O&M SUBMITTALS

A. Include all heavy-duty switch product data sheets, instruction, and warranty information in electrical gear O&M submittal.

1.04 QUALITY ASSURANCE

A. UL Compliance: Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

PART 2 PRODUCTS

2.01 HEAVY-DUTY SAFETY SWITCHES

A. Construction:
   1. Switchblades and jaws shall be plated copper.
   2. Switches shall have copper current carrying parts.
   3. Switches shall have a handle that is easily padlockable in the ON and OFF position.
   4. Switches shall have defeatable door interlocks that prevent the door from opening when the handle is in the ON position.
   5. Switch assembly and operating handle shall be an integral part of the enclosure base.
   6. Switches rated 100A to 600A shall have reinforced fuse clips.
   7. Switchblades shall be readily visible in the OFF position.
   8. Switch operating mechanism shall be non-teasible, positive quick-make/ quick-break type (except 30A plug fuse-type).
   9. Fusible switches shall be suitable for service entrance equipment.
   10. Switches shall have line terminal shields.

B. Manufacturers:
   1. Square D
   2. Siemens
   3. General Electric
   4. Eaton

C. Enclosures:
   1. The enclosure shall be NEMA 3R steel, outdoor, unless otherwise noted.
   2. The enclosure shall be finished with gray baked enamel paint.
   3. The enclosure shall have ON and OFF markings stamped into the cover.
   4. The operating handle shall be provided with a dual colored, red/black position indication.

D. Switch Ratings:
   1. The UL Listed short circuit current rating of the switch shall be 10,000 rms, symmetrical amperes when used with or protected by Class H or K fuses (30-600 amperes) and 200,000 rms, symmetrical amperes when used with or protected by Class R or Class J fuses (30-600 amperes switches employing appropriate fuse rejection schemes).

2.02 NAMEPLATES

A. Nameplates shall be front cover mounted, contain a permanent record of switch type, ampere rating, and maximum voltage rating.

PART 3 EXECUTION

3.01 FACTORY TESTING

A. Standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.

3.02 INSTALLATION

A. The equipment shall be installed per the manufacturer's recommendations and the contract drawings.

B. Contractor is responsible for providing all mounting brackets and structure to provide proper support and working clearances.

END OF SECTION

SECTION 26 45 10
GROUNDING AND LIGHTNING PROTECTION

PART 1 GENERAL

1.01 SUBMITTALS

A. Shop Drawings:
   1. Product Data:
      a. Exothermic weld connectors
      b. Mechanical connectors
      c. Compression connectors
      d. Ground Rods
      e. Surge Arresters

1.02 UL COMPLIANCE

A. Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

1.03 GROUNDING SYSTEM

A. The grounding system is a solidly grounded neutral system that is multi-grounded. The grounding electrode is the grounding rings formed by the conductors encircling the equipment and/or structures.

B. Ground resistance must measure 5 ohms or less. Contractor to add supplemental ground rod where necessary to achieve the resistance required.

C. Resistance to ground for individual electrodes shall be 25 Ohms or les.

PART 2 PRODUCTS

2.01 GROUND ELECTRODE

A. Ground electrode shall be made using a driven ground rod.

B. Ground rods shall not be cut.

C. Material: Copper Bonded.

D. Size: 3/4” x 10’ or as indicated on the drawing.

E. Ground Enhancement Material (GEM) backfill, if required.

F. Manufacturers: Erico, Inc.; ground rods and GEM backfill.

2.02 GROUND CONDUCTORS

A. Conductor size as indicated on the Contract Drawings.

B. As specified in Section 260519, CONDUCTORS.

2.03 CONNECTORS

A. Exothermic Weld Type:
   1. Outdoor Weld: Suitable for exposure to elements or direct burial.
   2. Manufacturers:
      a. Erico Products, Inc.; Cadweld and Cadweld Exolon

b. Thermoweld

B. Below Grade Compression Type:
1. Irreversible high strength compression.
2. Pure wrought copper extrusion.
3. Barrels prefilled with oxide-inhibiting and anti-seizing compound and sealed.
4. Manufacturers:
a. Burndy Corp, hyground compression system

C. Above Grade Compression Type for Equipment Ground Connection:
1. Single indentation for conductors 6 AWG and smaller.
2. Double indentation with extended barrel for conductors 4 AWG and larger.
3. Barrels prefilled with oxide-inhibiting and anti-seizing compound and sealed.
4. Specifically listed for ground connections
5. All mechanical hardware, nuts, bolts and washers shall be high strength copper alloy.
6. Manufacturers:
a. Burndy Corp.

2.04 LOW-VOLTAGE SURGE/LIGHTNING ARRESTORS AND SURGE PROTECTIVE DEVICE (MAIN BREAKER)

A. UL 1449 4th Edition.

B. Surge arrestor to be placed in a 304 stainless-steel NEMA 4X enclosure.

C. IEEE Exposure Category C.

D. Install with lead lengths not greater than manufacturer requirements.

E. Manufacturers:
1. Eaton Model SPD 250 240S 1Q (external mounted) or approved equal.

PART 3 EXECUTION

3.01 GENERAL

A. Grounding shall be in compliance with NEC Article 250, NFPA 70 and ANSI C2.

B. Ground each separately derived system neutral in accordance with NEC 250-30.

C. Bond together system neutrals, service equipment enclosures, exposed noncurrent-carrying metal parts of electrical equipment, metal raceways, ground conductor in raceways and cables, receptacle ground connections, and metal piping systems.

D. Surge protective devices shall be installed in locations as shown on the Contract Drawings.

E. Shielded Instrumentation Cables:
1. Expose shield minimum 1 inch at termination to field instrument and apply heat shrink tube.
2. Do not ground instrumentation cable shield at more than one point.

F. Ground grid conductors to be installed not less than 30 inches deep.

G. Contractor must pay close attention to NEC 250-24 to avoid the creation of parallel paths to ground.

3.02 WIRE CONNECTIONS

A. A separate grounding conductor is required in every raceway and must be at least 12 AWG.

B. Nonmetallic Raceways and Flexible Tubing: Install an equipment-grounding conductor connected at both ends to noncurrent carrying grounding bus.

C. Connect ground conductors to raceway grounding bushings.

D. Extend and connect ground conductors to ground bus in all equipment containing a ground bus.

E. Connect enclosure of equipment containing ground bus to that bus.

F. Bolt connections to equipment ground bus.

G. Bond grounding conductors to metallic enclosures at each end, and to intermediate metallic enclosures.

H. Junction Boxes: Furnish materials and connect to equipment grounding system with grounding clips mounted directly on box, or with 3/8-inch machine screws. All junction boxes shall have grounding stud to install grounding door jumper.

3.03 MOTOR GROUNDING

A. Extend equipment ground bus via grounding conductor installed in motor feeder raceway; connect to motor frame.

B. Nonmetallic Raceways and Flexible Tubing: Install an equipment-grounding conductor connected at both ends to noncurrent carrying grounding bus.

C. Motors Less Than 10 hp: Furnish compression, spade-type terminal connected to conduit box mounting screw.

D. Motors 10 hp and above: Tap motor frame or equipment housing; furnish compression, one-hole, lug type terminal connected with minimum 5/16-inch 304 stainless-steel threaded-stud with bolt and washer.

E. Circuits 20 Amps or above: Tap motor frame or equipment housing; install solderless terminal with minimum 5/16-inch diameter bolt.

3.04 GROUND ELECTRODES

A. Ground electrode connections made within ground test wells and above grade shall be mechanical type. Ground electrode connections below grade shall be exothermic weld type.

B. Install ground rod full length with conductor connection at upper end. The ground rod shall be driven into undisturbed earth.

C. If soil conditions prevent driving the ground rod to full length, installation shall by accomplished by augering a 3” diameter or larger hole and backfilling with compacted ground enhancement material.

D. Install top of rod 6 inches below finished grade, unless otherwise shown.

E. If the resistance to ground exceeds 20 ohms, drive an additional rod, separated by more than 6 feet, and connect in parallel. If the ground resistance still exceeds 20 ohms, notify the Engineer.

3.05 CONNECTIONS

A. General:
   1. Above Grade Connections: Use either exothermic weld, mechanical, or compression-type connectors.
   2. Below Grade Connections: Install exothermic weld or compression type connectors.
   3. Remove paint, dirt, or other surface coverings at connection points to allow good metal to-metal contact.

4. Notify OWNER prior to backfilling ground connections.

B. Exothermic Weld Type:
   1. Wire brush or file contact point to bare metal surface.
   2. Use welding cartridges and molds in accordance with manufacturer's recommendations.
   3. Do not use badly worn molds.
   4. Mold to be completely filled with metal when making welds.
   5. After completed welds have cooled, brush slag from weld area and thoroughly clean joint.

C. Compression Type:
   1. Install in accordance with connector manufacturer's recommendations.
   2. Install connectors of proper size for grounding conductors and ground rods specified.
   3. Install using connector manufacturer's compression tool having proper sized dies.

D. Mechanical Type:
   1. Apply homogeneous blend of colloidal copper and rust and corrosion inhibitor before making connection.
   2. Install in accordance with connector manufacturer's recommendations.
   3. Do not conceal mechanical connections.

3.06 METAL STRUCTURE GROUNDING

A. Ground metal sheathing and exposed metal vertical structural elements to grounding system.

B. Bond electrical equipment supported by metal platforms to the platforms.

C. Provide electrical contact between metal frames and railings supporting pushbutton stations, receptacles, and instrument cabinets, and raceways carrying circuits to these devices.

3.07 HANDHOLE AND MANHOLE GROUNDING

A. Install one ground electrode inside each where shown on drawing.

B. Ground Electrode Floor Protrusion: 4 to 6 inches above floor.

C. Make connections of grounding conductors fully visible and accessible.

D. Connect all noncurrent-carrying metal parts, and any metallic raceway grounding bushings to ground electrode conductor with No. 6 AWG copper conductor.

3.08 TRANSFORMER GROUNDING

A. Bond neutrals of transformers within buildings to grounding source.

B. Bond neutrals of transformers to a locally installed ground electrode.

3.09 SURGE PROTECTION EQUIPMENT GROUNDING

A. Connect surge arrester ground terminals to equipment ground bus.

3.10 TESTING

A. Contractor shall perform 3-point fall of potential ground testing using testing equipment calibrated within the previous 12 months. The soil must be dry during testing. The ground grid conductor shall be 5 ohms or less and each independent ground electrode shall be 20 ohms or less. Schedule GBRA to witness all testing.

END OF SECTION

SECTION 26 94 00
INSTRUMENTATION HEAT TRACE SYSTEM

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Furnish and install thermostatically controlled heat trace system for freeze protection.

B. The system shall include controls, control cabinet, cable, insulation and jacket as indicated on the Contract Drawings and as specified hereinafter.

C. Furnish and install all weather-tight LB fittings, liquid-tight connectors, liquid-tight flexible metal conduit and wiring, etc., to provide power and controls for a complete operating system.

D. Items to be protected by heat trace include:

E. Instrument fluid housings and all associated piping, valves, fittings, etc. This includes pressure switches, pressure gauges, pressure transmitters, process piping associated with gauges/transmitters.

F. All exposed piping 4" and smaller conveying liquids shall be heat traced, insulated, and covered with aluminum jacketing. Pipes with continuous flow are exempt from this requirement.

1.02 SUBMITTALS:

A. Heat Trace Cable.

B. Heat Trace Cable Insulation and Jacket.

C. Heat Trace Thermostat.

D. Heat Trace Panel Wiring.

E. Ground Fault Protection

PART 2 PRODUCTS

2.01 HEAT TRACE CABLE:

A. Heat cable shall be U.L. listed, self-regulating, with additional footage at all valves, instruments, and pipe supports, as recommended by the manufacturer. Maximum circuit lengths shall be in accordance with the manufacturer's recommendations.

B. Manufacturer: Heat cable shall be Raychem "5BTV1", 6 watts/ft at 40°F for operation at 120 volts, or equal product as manufactured by Chromalox or Thermon.

2.02 HEAT TRACE CABLE INSULATION AND JACKET:

A. The insulation shall be pre-formed cellular glass insulation, 1-inch-thick minimum, non-absorptive, impermeable to moisture and impervious to hydrochloric acid.
   1. Manufacturer: Heat trace insulation shall be Pittsburg Corning "Foamglas", Armstrong Armaflex II pipe insulation, or approved equal.

B. A weather-resistant, watertight, protective finish or jacket shall be applied over all insulation as recommended and manufactured by the insulation manufacturer.
   1. Outdoor above ground jacketing will be O16 Aluminum.
   2. Outdoor below ground (buried) jacketing will be Pittsburg Corning PittWrap HS.

C. Manufacturer: Heat trace insulation shall be Pittsburg Corning “Foamglas”, Armstrong Armaflex II pipe insulation, or approved equal.

2.03 HEAT TRACE THERMOSTAT (HTT) AND CONTACTOR (HTC):

A. Heat trace circuits shall be switched through a thermostat, set at 40°F, and a multipole contactor (HTC) as indicated on the Contract Drawings. The contactor shall be NEMA rated, 20 ampere, 120 volts, multipole, with 120-volt control coil. The thermostat shall be weatherproof, line-type, 120 volts.

B. Manufacturer: Heat trace thermostat shall be Thermon model B4X.

2.04 GROUND FAULT PROTECTION OF EQUIPMENT(GFPE):

A. The Over Current Protection Device (OCPD) for the heat tracing will be Ground-Fault Protection of Equipment (GFPE) to meet NEC 427.22. Schneider Electric’s QO circuit-breakers are the most common which meet this requirement. Manufacturers which offer equivalent products are allowed.

B. GFPE offers different overcurrent protection technology than a GFCI. Any other technology than GFPE will be rejected as it does not meet NEC 427.22.

PART 3 EXECUTION

3.01 HEAT TRACE CABLE:

A. Spiral the heat cable around the pipe, crisscross around valves, and attach cable to pipe with GT-66 glass fiber adhesive tape or plastic tie wraps.

B. All power connections to heat trace cable shall be made in watertight j-boxes or with power connection kits recommended by the cable manufacturer. Tees, splices, terminations, and cable shall be of the same manufacturer.

3.02 HEAT TRACE CABLE INSULATION:

A. Install insulation over the entire length of piping protected with heat cable. Insulation shall be mitered and nested to cover all tees, fittings, supports, valves, etc. Fitting covers may be pre-formed or field fabricated. The inner bore and joint surfaced shall be coated to fill the surface cells, and all joints shall be sealed as recommended by the manufacturer and secured in place with ½-inch-wide stainless-steel bands.

END OF SECTION

SECTION 26 95 00
COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SCOPE

A. Contractor will provide, or pay the cost of, electrical testing by an independent testing firm. This cost shall be included in the Contract Bid.

B. The Contractor shall immediately correct all deficiencies discovered during testing. Any work that fails testing must be corrected and retested. Any work that is disturbed must be retested.

C. All electrical testing including but not limited to: 3-point fall of potential ground testing, conductor megger testing of all 480v conductors, RTU battery drawdown testing, etc. Shall be performed by the electrical contractor or independent testing firm, and shall be witnessed by GBRA. Once all equipment has been installed, the contractor shall self-perform operational demonstration testing. The contractor shall startup, test, and verify all equipment is operational and that all alarms and statuses are correctly displayed both locally and at the western canyon control room. Once completed, contractor shall schedule GBRA to witness successful demonstration testing. Contractor shall coordinate schedule with GBRA at least two (2) weeks in advance.

1.02 REFERENCES

A. International Electrical Testing Association – Acceptance Testing Specifications (NETA-ATS), current version.

B. Related equipment specifications in all sections of Division 26.

1.03 SUBMITTALS

A. Administrative Submittals: Submit 30 days prior to performing inspections or tests:
   1. Schedule for performing inspection and tests.
   2. List references to be used for each test.
   3. Sample copy of equipment and materials inspection form(s).
   4. Sample copy of individual device test form.
   5. Sample copy of individual system test form.

B. Quality Control Submittals: Submit within 15 days after completion of test:
   1. Test or inspection reports and certificates for each electrical item tested.

C. Contract Closeout Submittals:
   1. Operation and Maintenance Data:
      a. In accordance with Division 1.
      b. After test or inspection reports and certificates have been reviewed by OWNER and returned, insert a copy of each in operation and maintenance manual.

D. Field and laboratory testing firms shall include GBRA on the distribution list for all test reports related to GBRA facilities.

1.04 QUALITY ASSURANCE

A. Testing Firm Qualifications:
   1. Corporately and financially independent organization functioning as an unbiased authority, for a minimum of 5 years.

2. Employer of engineers and technicians regularly engaged in testing and inspecting electrical equipment, installations, and systems.
3. Supervising technician having a minimum of 5 years testing experience on similar projects.
4. Full-time employed Registered Professional Engineer to provide comprehensive project report outlining services performed, results of such services, recommendations, actions taken, and opinions.

B. Test equipment shall have an operating accuracy equal to, or greater than, requirements established at NETA-ATS.

C. Test instrument calibration shall be in accordance with NETA-ATS.

D. Testing equipment must have been calibrated within the previous 12 months.

1.05 SEQUENCE AND SCHEDULING

A. Perform inspection and electrical tests after equipment has been installed.

B. Perform tests with apparatus de-energized whenever feasible.

C. Inspection and electrical tests on energized equipment are to be:
1. Scheduled with OWNER prior to de-energization.
2. Minimized to avoid extended period of interruption to the operating plant equipment.

D. Notify OWNER at least 24 hours prior to performing tests on energized electrical equipment.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 GENERAL

A. Tests specified in this section are to be performed in accordance with the requirements of Section 017520, Facility Startup and Commissioning Requirements.

B. Tests and inspection shall establish that:
1. Electrical equipment is operational within industry and manufacturer's tolerances.
2. Installation operates properly.
3. Equipment is suitable for energization.
4. Installation conforms to requirements of Contract Documents and NFPA 70, NFPA 70E, and ANSI C2.

C. Perform inspection and testing in accordance with NETA-ATS, industry standards, and manufacturer's recommendations.

D. Set, test, and calibrate protective relays, circuit breakers, and other applicable devices in accordance with standard values established by a short circuit and coordination study provided by CONTRACTOR.

E. Adjust mechanisms and moving parts for free mechanical movement.

F. Adjust adjustable relays and sensors to correspond to operating conditions, or as recommended by manufacturer.

G. Verify nameplate data for conformance to Contract Documents.

H. Tighten accessible bolted connections, including wiring connections, with calibrated torque wrench to manufacturer's recommendations, or as otherwise specified.

I. Clean contaminated surfaces with cleaning solvents as recommended by manufacturer.

J. Provide proper lubrication of applicable moving parts.

K. Inform OWNER of working clearances not in accordance with NFPA 70.

3.02 LOW VOLTAGE CABLES, 600 VOLTS MAXIMUM

A. Visual and Mechanical Inspection:
   1. Inspect Each Individual Exposed Power Cable No. 4 and Larger for:
      a. Physical damage.
      b. Proper connections in accordance with single-line diagram.
      c. Cable bends not in conformance with manufacturer's minimum allowable bending radius where applicable.
      d. Color-coding conformance with specifications.
      e. Proper circuit identification.
   2. Mechanical Connections For:
      a. Proper lug type for conductor material.
      b. Proper lug installation.
      c. Bolt torque level in accordance with NETA-ATS, Table 10.12, unless otherwise specified by manufacturer.
   3. Shielded Instrumentation Cables For:
      a. Proper shield grounding.
      b. Proper terminations.
      c. Proper circuit identification.
   4. Control Cables For:
      a. Proper termination.
      b. Proper circuit identification.
   5. Cables Terminated Through Window Type CTs: Verify that neutrals and grounds are terminated for correct operation of protective devices.

B. Electrical Tests for 480 Volt conductors:
   1. Insulation Resistance Tests:
      a. Utilize 1,000-volt dc megohmmeter for 600-volt insulated conductors.
      b. Test each conductor with respect to ground and to adjacent conductors per IEEE 118 procedures for 1 minute.
      c. Evaluate ohmic values by comparison with conductors of same length and type.
      d. Investigate values less than 50 megohms.
   2. Continuity test by ohmmeter method to ensure proper cable connections.
   3. Schedule GBRA to witness 480V conductor Megger testing prior to termination of any 480V conductors.

3.03 SAFETY SWITCHES, 600 VOLTS MAXIMUM

A. Visual and Mechanical Inspection:
   1. Proper blade pressure and alignment.
   2. Proper operation of switch operating handle.
   3. Adequate mechanical support for each fuse.
   4. Proper contact-to-contact tightness between fuse clip and fuse.
   5. Cable connection bolt torque level in accordance with NETA-ATS, Table 10.12.
   6. Proper phase barrier material and installation.
   7. Verify that fuse sizes and types correspond to one-line diagram.
   8. Perform mechanical operational test and verify mechanical interlocking system operation and sequencing.

3.04 METERING AND INSTRUMENTATION:

A. Visual and Mechanical/Electrical Inspection:
   1. Verify meter and instrument connections in accordance with appropriate diagrams.
   2. Verify meter multipliers.
   3. Verify that meter and instrument types and scales conform to Contract Documents.
   4. Check calibration of meters at cardinal points.
   5. Check calibration of transducers and transmitters.
   6. Check set-point and operation of pressure switches.
   7. Verify operation of heat trace systems.

3.05 SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA)

A. Visual and Mechanical Inspection:
   1. Verify System Wiring:
      a. Compare wiring to elementary diagrams.
      b. Check for proper conductor lacing and bundling.
      c. Check for proper conductor identification.
      d. Check lugs and terminations.
   2. Verify labels and nameplates.
   3. Verify component equipment and instrumentation conforms to Contract Documents.
   4. Verify component electrical and mechanical connections conform to manufacturer's instructions.

B. Operational Testing:
   1. Check each control panel display and switch for proper control loop function.
   2. Verify each Input/Output point from the end element to the remote central operations center.
   3. Verify calibration and scale of each analog quantity.
   4. Battery system shall have sufficient capacity to power the RTU for a minimum of a four (4) hour duration. Battery shall be tested by disconnecting normal RTU power and verifying communication is maintained between RTU and Western Canyon Control Room.

3.06 GROUNDING SYSTEMS

A. Visual and Mechanical Inspection:
   1. Equipment and circuit grounds in motor control centers and switchgear assemblies for proper connection and tightness.
   2. Ground bus connections in motor control centers and switchgear assemblies for proper termination and tightness.
   3. Effective transformer core and equipment grounding.
   4. Accessible connections to grounding electrodes for proper fit and tightness.
   5. Accessible exothermic-weld grounding connections to verify that molds were fully filled and proper bonding was obtained.

B. Electrical Tests:
   1. Fall-Of-Potential Test:
      a. In accordance with IEEE 81, Section 8.2.1.5 for measurement of main ground system's resistance.
      b. Main ground electrode system resistance to ground to be no greater than 25 Ohms when disconnected from the utility company ground system.
      c. Fully-connected ground-system shall measure 25 Ohms or less. Independent ground electrodes shall measure 20 Ohms or less. Install supplemental ground electrodes if measurement exceeds those values.

3.07 THERMOGRAPHIC SURVEY

A. General:
   1. Equipment to be inspected shall include all current-carrying devices including switchgear, switchboards, panelboards, breakers, fuse holders, switches and bus connections/joints.

B. Visual and Mechanical Inspection:
   1. Perform thermographic survey when load is applied to the system.
   2. Remove all necessary covers prior to thermographic inspection. Use appropriate caution, safety devices, and personal protective equipment.
   3. Perform a follow-up thermographic survey within 12 months of final acceptance by the owner.

C. Report:
   1. Provide a report which includes the following:
      a. Description of equipment tested.
      b. Discrepancies.
      c. Temperature difference between the area of concern and the reference area.
      d. Probable cause of temperature difference.
      e. Areas inspected. Identify inaccessible and/or unobservable areas and/or equipment.
      f. Identify load conditions at time of inspection.
      g. Provide photographs and/or thermograms of the deficient area.
      h. Recommended action.

D. Test Parameters:
   1. Inspect distribution systems with imaging equipment capable of detecting a minimum temperature difference of 1° C at 30° C.
   2. Equipment shall detect emitted radiation and convert detected radiation to visual signal.
   3. Thermographic surveys should be performed during periods of maximum possible loading. Refer to ANSI/NFPA 70B, Section 20.17.

END OF SECTION

SECTION 40 61 13
PROCESS CONTROL SYSTEM GENERAL PROVISIONS

PART 1 GENERAL

1.01 SCOPE

A. Furnish all labor, materials and equipment required to provide, install, test and make fully operational, a Process Instrumentation and Control System as specified herein and as shown on the Drawings.

B. The work shall include furnishing, installing and testing the equipment and materials detailed in each Section of Division 40 of Instrumentation and Controls.

C. Equipment furnished as a part of other Divisions, and shown on the Electrical Drawings shall be integrated into the overall Process Instrumentation and Control System under this Division. Instrumentation specified in other Divisions shall meet the Specification requirements of this Division.

D. The Contractor shall provide the services of a Process Control Systems Integrator (PCSI) who shall perform all work necessary to select, furnish, configure, customize, debug, install, connect, calibrate, and place into operation all instrumentation and control hardware specified within this Division, except for application software programming, which is specified in Section 40 61 95, Application Services. The PCSI shall coordinate with the Owner, Engineer and ASP (Application Services Provider, defined in paragraph 1.06 below) for all scheduling, installation, and startup services. The PCSI shall have qualifications as described herein.

E. Application services programmer shall be certified by Inductive Automation for HMI software. Contractors shall be gold level certified. Integration must be performed by employees that are gold level certified, experienced, and competent in the implementation of Ignition HMI software. Submit certifications, qualifications, and experience for GBRA review and approval.

F. The PCSI shall coordinate and schedule all required testing with the General Contractor, Owner, Engineer and Applications Services Supplier (ASP).

G. The work shall include the following:
   1. Furnish and install new SCADA (PLC) Panels as shown on the contract drawings.
   2. Furnish, install, configure and calibrate all instruments as shown in Specification 40 70 00 INSTRUMENTATION FOR PROCESS SYSTEMS and per GBRA specification 13442 Flanged Magnetic Flowmeters.
   3. Furnish, configure, calibrate and install all instruments per specification 40 70 00 and shown on the Drawings.
   4. Surge suppression devices shall be provided at control panels interfacing the instruments and at the instruments as shown on the Drawings and specified in Division 40 Instrumentation and Controls specification sections.
   5. Furnish and install all communications network devices required per the Contract Drawings.
   6. Coordinate with the ASP and equipment suppliers to deliver a complete and fully functional process control system.
   7. Coordinate all PCSI work giving consideration to specified construction sequencing constraints.

8. Make connections, including field connections and interfacing between instrumentation, controllers, control devices, control panels and instrumentation furnished under other Divisions. The PCSI shall coordinate his construction schedule and instrumentation and control interface with the supplier of instrumentation and control equipment specified under other Divisions.
9. Make wiring terminations for all field-mounted instruments furnished and mounted under other Divisions, including process instrumentation primary elements, transmitters, local indicators and control panels. Install vendor furnished cables specified under other Divisions.
10. Auxiliary and accessory devices necessary for system operation or performance to interface with existing equipment or equipment provided by other suppliers under other Sections of these specifications, shall be included whether or not they are shown on the Drawings. These devices include but are not limited to, transducers, current isolators, signal conditioners or interposing relays.
11. Equipment shall be fabricated, assembled, installed, and placed in proper operating condition in full conformity with detail drawings, specifications, engineering data, instructions, and recommendations by the equipment manufacturer as approved by the Engineer.
12. Actual installation of the system need not be performed by the PCSI's employees; however, the PCSI shall provide the on-site technical supervision of the installation.
13. The PCSI shall furnish equipment which is the product of one manufacturer to the maximum practical extent. Where this is not practical, all equipment of a given type shall be the product of one manufacturer.
14. All materials, equipment, labor, and services necessary to achieve the monitoring and control functions described herein shall be provided in a timely manner so that the monitoring and control functions are available when the equipment is ready to be placed into service.
15. Provide all electrical relocation work associated with the relocation of equipment for the existing and new facilities, including disconnecting all existing wiring and conduits and providing new wiring and conduit to the relocated equipment.
16. Coordinate the sequence of demolition with the sequence of construction to maintain pump station operation. Remove and demolish equipment and materials in such a sequence that the existing and proposed pump station will function properly with no disruption of water service.
17. All bidders shall visit the site of the project, prior to submitting a bid, and satisfy themselves as to any question that they might have, relating to existing equipment, condition or construction.
18. Each calibration/recalibration certificate shall be signed and dated by an authorized representative of the CONTRACTOR. Three copies of each completed certificate shall be submitted to the ENGINEER.
19. Required calibration data are listed in Part 3 Testing.

1.02 RELATED SECTIONS:

A. Where references are made to the Related Work paragraph in each Specification Section, referring to other Sections and other Divisions of the Specifications, the Contractor shall provide such information or work as may be required in those references, and include such information or work as may be specified.

B. All Instrumentation work related to Process and Mechanical Divisions equipment that is shown on the Instrumentation Drawings shall be provided under Division 40.

C. All instrumentation work provided under any Division of the Specifications shall fully comply with the requirements of Division 40.

D. Related Sections:
   1. Section 40 61 21 Process Control System Testing
   2. Section 40 61 93 Input/Output List
   3. Section 40 61 95 Application Services
   4. Section 40 63 43 Programmable Logic Controller (PLC)
   5. Section 40 67 00 Control System Equipment Panels
   6. Section 40 70 00 Instrumentation for Process Systems
   7. Section 40 78 00 Panel Mounted Equipment

1.03 SUBMITTALS

A. Submit catalog data for all items supplied from this specification Section as applicable. Submittal shall include catalog data, functions, ratings, inputs, outputs, displays, etc. sufficient to confirm that the equipment provides every specified requirement. Any options or exceptions shall be clearly indicated.

B. Submittals for equipment specified herein, for other Sections or Divisions, shall be made as a part of equipment submittals furnished under other Sections or Divisions.

C. General Requirements:
   1. Refer to Division 1 for general submittal requirements.
   2. Other I&C Division 40 Sections have additional submittal requirements. Refer to other Instrumentation and Controls Division 40 Sections for details.
   3. Shop drawings shall be submitted as detailed herein. Shop drawings shall demonstrate that the equipment and services to be furnished comply with the provisions of these Specifications and shall provide a complete record of the equipment as manufactured and delivered.
   4. Submittals shall be complete, giving equipment specifications, details of connections, wiring, ranges, installation requirements, and specific dimensions. Submittals consisting of only general sales literature shall not be acceptable.
   5. Submittals shall be bound in separate three-ring binders, with an index and sectional dividers, with all Drawings reduced to a maximum size of 11-inch by 17- inch, then folded to 8.5-inch by 11-inch for inclusion within the binder. Maximum binder size shall be 3 inches.
   6. The submittal Drawings' title block shall include, as a minimum, the PCSI's registered business name and address, Owner and project name, Drawing name, revision level, and personnel responsible for the content of the Drawing.
   7. Each Section submittal shall be complete, contain all of the items listed in the Specification Section, and shall be clearly marked to indicate which items are applicable on each cut sheet page. All submittals shall list any exceptions to the Specifications and Drawings, and the reason for such deviation. Shop drawings, not so checked and noted, will be returned without review.
   8. The Contractor shall check shop drawings for accuracy and compliance with the requirements of the Contract Documents prior to submittal to the Engineer. Errors and omissions on approved shop drawings shall not relieve the Contractor from the responsibility of providing materials and workmanship required by the Specifications and Drawings. Shop drawings shall be stamped with the date checked and a Statement indicating that the shop drawings conform to Specifications and Drawings. Only one Specification Section submittal will be allowed per transmittal unless it has been indicated that grouping is permitted in the individual sections.

9. Material shall not be ordered or shipped until the shop drawings have been approved. No material shall be ordered or shop work started if shop drawings are marked "EXCEPTIONS NOTED", "RESUBMIT (RETURNED FOR CORRECTION)" or "REJECTED".
10. Shop Drawings, O&M Manuals, and other documentation, shall be submitted as listed in each of the individual specification Sections.
    a. Submit operations and maintenance data for equipment furnished under this Division, in accordance with Division 1. The manuals shall be prepared specifically for this installation and shall include catalog data sheets, drawings, equipment lists, descriptions, parts lists and operating and maintenance instructions.
    b. Manuals shall include the following as a minimum:
        1) A comprehensive index
        2) A complete "As-Built" set of approved shop drawings.
        3) A complete list of the equipment supplied, including serial numbers, ranges and pertinent data.
        4) A table listing of the "as left" settings for all timing relays and alarm and trip setpoints
        5) System schematic drawings "As-Built", illustrating all components, piping and electric connections of the systems supplied under this Division.
        6) Detailed service, maintenance and operation instructions for each item supplied.
        7) Special maintenance requirements particular to this system shall be clearly defined, along with special calibration and test procedures.
        8) The operating instructions shall also incorporate a functional description of the entire system, with references to the systems schematic drawings and instructions.
        9) Complete parts list with stock numbers, including spare parts.
11. Record Drawings shall be promptly furnished when the equipment installation is complete. Payment will be withheld until Record Drawings have been furnished and approved. The PCSI shall provide markups on all Process and Instrumentation Contract Drawings.
12. At the time of delivery of the equipment, the Contractor shall have an approved shop drawing in his possession for the Owner’s Inspector and Owner’s Engineer’s verifications.

D. Installation experience documentation shall be submitted for approval with the Section Equipment Submittal.

E. Operations and Maintenance Manuals:
    1. Operations and Maintenance manuals shall be constructed in accordance with Division 1 and shall include the following information:
        a. Manufacturer’s contact address and telephone number for parts and service.
        b. Instruction books and/or leaflets
        c. Recommended renewal parts list
        d. Record documents for the information required by the Submittals section above.

1.04 REFERENCE CODES AND STANDARDS:

A. The equipment in this specification shall be designed and manufactured according to latest revision of the following standards (unless otherwise noted):
    1. National Electrical Safety Code (NESC)
    2. Occupational Safety and Health Administration (OSHA)
    3. National Fire Protection Association (NFPA)
    4. National Electrical Manufacturers Association (NEMA)
    5. American National Standards Institute (ANSI)
    6. Insulated Cable Engineers Association (ICEA)
    7. International Society of Automation (ISA)

8. Underwriters Laboratories (UL)
9. UL 508, the Standard of Safety for Industrial Control Equipment
10. UL 508A, the Standard of Safety for Industrial Control Panels
11. UL 50, the Standard of Safety for Enclosures for Electrical Equipment
12. NFPA 79, Electrical Standard for Industrial Machinery
13. Factory Mutual (FM)
14. City of Boerne, Texas Electrical Code
15. All equipment and installations shall satisfy applicable Federal, State, and local codes.
16. All meters, relays and associated equipment shall comply with the requirements of the National Electric Code and Underwriters Laboratories (UL) where applicable.
17. Each specified device shall also conform to the standards and codes listed in the individual device paragraphs.

B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

C. All material and equipment, for which a UL standard exists, shall bear a UL label. No such material or equipment shall be brought onsite without the UL label affixed.

D. If the issue of priority is due to a conflict or discrepancy between the provisions of the Contract Documents and any referenced standard, or code of any technical society, organization or association, the provisions of the Contract Documents shall take precedence if they are more stringent or presumptively cause a higher level of performance. If there is any conflict or discrepancy between standard specifications, or codes of any technical society, organization or association, or between Laws and Regulations, the higher performance requirement shall be binding on the Contractor, unless otherwise directed by the Owner/Engineer.

E. In accordance with the intent of the Contract Documents, the Contractor accepts the fact that compliance with the priority order specified shall not justify an increase in Contract Price or an extension in Contract Time nor limit in any way, the Contractor's responsibility to comply with all Laws and Regulations at all times.

F. All control panels shall be constructed and the labeling shall be affixed in a UL 508 facility.

1.05 PROCESS CONTROL SYSTEMS INTEGRATOR (PCSI):

A. The Contractor shall provide the services of a Process Control Systems Integrator (PCSI) for work under this Division and other Divisions, as described in this Division and other Divisions.

B. Where shown on the Bid Documents, the Contractor shall name the proposed PCSI. Qualifications:
1. The PCSI shall be a "systems house," regularly engaged in the design and installation of control and instrumentation systems and their associated subsystems as they apply to the municipal water or wastewater industry. For the purposes of this and other applicable Divisions, a "systems house" shall be interpreted to mean an organization that complies with all of the following criteria.
2. Employs a registered professional Control Systems Engineer or Electrical Engineer in the state of Texas to supervise or perform the work required by this Specification Section.
3. Employs personnel on this project who have successfully completed a manufacturer’s training course on the hardware configuration and implementation of the specific programmable controllers, computers, and software proposed for this project.
4. Has been in the water/wastewater industry performing the type of work specified in this specification section for a minimum of five (5) continuous years.

5. The PCSI shall maintain a fully equipped office/production facility with full-time employees capable of fabricating, configuring, installing, calibrating, troubleshooting, and testing the system specified herein. Qualified repair personnel shall be available and capable of reaching the facility within 24 hours.

C. Recommended PCSIs:
   1. Alterman Management Group
      7805 N Loop 1604
      Live Oak, Texas 78233
      Telephone: 210.496.6888
   2. Control Panels USA
      16310 Bratton Lane, Suite 100
      Austin, Texas 78728
      Phone: 512.863.3224
   3. Prime Controls
      815 Office Park Circle
      Lewisville, Texas 75057
      Telephone: 972.221.4849
   4. Richardson Logic Control
      8115 Hicks Hollow
      McKinney, Texas 75071
      Telephone: 972.542.7375
   5. Wunderlich – Malec
      2855 Trinity Square Drive, Suite 100
      Carrollton, Texas 75006
      Telephone: 469.574.2500

D. The listing of specific PCSI organizations above does not imply acceptance of their products and capabilities that do not meet the specified ratings, features and functions. PCSI's listed above are not relieved from meeting these specifications in their entirety.

1.06 APPLICATION SERVICES PROVIDER (ASP):

A. The PCSI shall procure the services of an Application Services Provider (ASP) for application software programming for the Human Machine Interface (HMI) computers as specified in Section 406195.

B. All other configuration, programming, and integration, including but not limited to, PLC configuration and/or programming, loading of software for process devices, Ethernet configuration and communications verification shall be performed by the PCSI as specified in other Sections.

C. Qualifications:

D. The ASP shall perform all work necessary to configure, customize, debug, install, connect, and place into operation all HMI and DCS software specified within this Division and other related divisions. The PCSI shall coordinate with the ASP all scheduling, installation, and startup services. The PCSI shall be on site at all times when the ASP is working on site.

E. Recommended ASPs:
   1. Prime Controls
      815 Office Park Circle
      Lewisville, Texas 75057
      Phone: 972.221.4849

2. Control Panels USA
   16310 Bratton Lane, Suite 100
   Austin, Texas 78728
   Phone: 512.863.3224
3. Signature Automation
   4347 W Northwest Hwy #120
   Dallas, Texas 75220
   Phone: 469.248.6840
4. Alterman Management Group
   7805 N Loop 1604
   Live Oak, Texas 78233
   Telephone: 210.496.6888

1.07 QUALITY ASSURANCE:

A. The manufacturer of this equipment shall have produced similar instrumentation equipment for a minimum period of five (5) years. When requested by the OWNER/ENGINEER, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

B. The equipment as submitted shall be located as shown on the project plans and shall fit within this location. Equipment with does not fit in the space as shown on the project plans is not acceptable.

C. For the equipment specified herein, the manufacturer shall be ISO 9001 2000 certified.

1.08 ENCLOSURE TYPES FOR AREA CLASSIFICATIONS:

A. Unless otherwise specified herein or shown on the Drawings, enclosures and associated installations shall have the following ratings:

B. Provide NEMA 4X 304 Stainless Steel enclosures for outdoor, wet locations or specifically shown on the Drawings.

C. Provide NEMA 4X FRP enclosures in the GBRA delivery point enclosure.

D. NEMA 1 or 1A enclosures will not be permitted, unless specifically stated on the Drawings.

E. All enclosures shall be lockable and provided with a padlock location.

1.09 CODES, INSPECTION AND FEES:

A. Equipment, materials and installation shall comply with the requirements of the local authority having jurisdiction.

B. Obtain all necessary permits and pay all fees required for permits and inspections.

1.10 RECORD DRAWINGS:

A. As the work progresses, legibly record all field changes on a set of Project Contract Drawings, hereinafter called the "Record Drawings". The Record Drawings and Specifications shall be kept up to date throughout the project.

B. Record Drawings shall accurately show the installed condition of the following items:
   1. One-line Diagram(s)
   2. Raceways and pull boxes
   3. Conductor sizes
   4. Panel Schedule(s)
   5. Control Wiring Diagram(s) including all wire tags

6. Process Instrumentation Diagram(s)
7. Mounting Details

C. Submit a typical example of a schedule of control wiring raceways and wire numbers, including the following information:
   1. Circuit origin, destination and wire numbers.
   2. Field wiring terminal strip names and numbers with field connection wire color.

D. As an alternate, submit a typical example of point-to-point connection diagrams showing the same information, may be submitted in place of the schedule of control wiring raceways and wire numbers.

E. Submit the record drawings and the schedule of control wiring raceways and wire numbers (or the point-to-point connection diagram) to the Owner/Engineer.

F. The Contractor's retainage shall not be paid until the point-to-point connection diagrams have been furnished to and approved by the Owner/Engineer.

1.11 EQUIPMENT INTERCONNECTIONS:

A. Review shop drawings of equipment furnished under other related Divisions and prepare coordinated wiring interconnection diagrams or wiring tables. Submit copies of wiring diagrams or tables with Record Drawings.

B. Furnish and install all equipment interconnections.

1.12 MATERIALS AND EQUIPMENT:

A. Materials and equipment shall be new, except where specifically identified on the Drawings to be re-used.

B. The Contractor shall not bring onsite, material or equipment from a manufacturer, not submitted and approved for this project. Use of any such material or equipment, will be rejected, removed and replaced by the Contractor, with the approved material and equipment, at his own expense.

C. Material and equipment shall be UL listed, where such listing exists.

D. The Contractor shall be responsible for all material, product, equipment and workmanship being furnished by him for the duration of the project. He shall replace the equipment if it does not meet the requirements of the Contract Documents.

1.13 DELIVERY, STORAGE AND HANDLING:

A. Equipment shall be handled and stored in accordance with manufacturer's instructions. Two (2) copies of these instructions shall be included with the equipment at time of shipment, and shall be made available to the Contractor and Owner.

B. Shipping groups shall be designed to be shipped by truck, rail, or ship. Indoor groups shall be bolted to skids. Accessories shall be packaged and shipped separately.

C. Equipment shall be equipped to be handled by crane. Where cranes are not available, equipment shall be suitable for skidding in place on rollers using jacks to raise and lower the groups.

D. Equipment shall be installed in its permanent, finished location shown on the Drawings within seven (7) calendar days of arriving onsite. If the equipment cannot be installed within seven (7) calendar days, the equipment shall not be delivered to the site, but stored offsite, at the Contractor's expense, until such time that the site is ready for permanent installation of the equipment.

E. Where space heaters are provided in equipment, provide temporary electrical power and operate space heaters during jobsite storage, and after equipment is installed in permanent location, until equipment is placed in service.

1.14 EQUIPMENT IDENTIFICATION:

A. Identify equipment furnished under Division 40 with the name of the equipment it serves. Control panels, Instruments, meters junction or terminal boxes, etc, shall have nameplate designations as shown on the Drawings.

B. All enclosures shall have black phenolic labels with white 3/8" block lettering, attached with aluminum rivets or stainless steel screws.

C. Prior to installing the nameplates, the metal surface shall be thoroughly cleaned, with a 70% alcohol solution, until the metal surface residue has been removed. Epoxy adhesive or foam tape is not acceptable.

1.15 WARRANTY:

A. The Manufacturer shall warrant the equipment to be free from defects in material and workmanship for a minimum of one (1) year from the date of project final acceptance of the equipment containing the items specified in this Section. Within such period of warranty the Manufacturer shall promptly furnish all material and labor necessary to return the equipment to new operating condition. Any warranty work requiring shipping or transporting of the equipment shall be performed by the CONTRACTOR at no expense to the OWNER.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.01 PCSI COORDINATION MEETINGS:

A. The PCSI shall schedule and administer a minimum of two (2) mandatory Coordination Meetings during the submittal phase of the project. The PCSI shall make arrangements for the meetings and prepare and send a proposed agenda to all participants at least one (1) week before scheduled meetings. The PCSI shall be responsible for promptly preparing and distributing meeting minutes to all attendees.

B. The PCSI shall prepare meeting minutes and distribute them to all attendees and others affected by any decisions made at the meetings. The meeting minutes shall be distributed within one (1) week following the meeting.

C. The meetings shall be held at the General Contractor's field office at the project site and shall include, at a minimum, attendance by the Owner, Engineer, General Contractor's project engineer, PCSI project engineer, ASP's project engineer, and the electrical subcontractor.
   1. The First Coordination Meeting shall be held in advance of the first Shop Drawing submittal. The purpose of the first meeting shall be for the PCSI to:
      a. Summarize their understanding of the project
      b. Discuss any proposed deviations, substitutions or alternatives
      c. Present the PCSI project schedule
      d. Schedule testing and delivery milestone dates
      e. Provide a forum for the PCSI to coordinate hardware and software related issues
      f. Request any additional information required from the Owner and/or Engineer.
      g. The PCSI shall bring a draft version of shop drawings to the meeting to provide the basis for the Owner/Engineer's input into their development.

2. The Second Coordination Meeting shall be held after the Field Instruments and Control Panel submittals have been reviewed and returned to the PCSI. The purpose of the second meeting shall be for the PCSI to:
    a. Discuss comments made during submittal process
    b. Refine schedule milestone dates
    c. Coordinate installation activities
    d. Discuss any remaining coordination requirements.
3. A typical agenda may include, but shall not be limited to, the following:
    a. Review minutes of previous meetings
    b. Review of work progress
    c. Field observations, problems, and decisions
    d. Identification of problems which may impede planned progress
    e. Review of submittal schedule and submittal status
    f. Review of offsite fabrications and delivery schedules
    g. Maintenance of progress schedule
    h. Corrective measures to regain projected schedules
    i. Planned activities for subsequent work period
    j. Coordination of projected progress
    k. Maintenance of quality and work standards
    l. Effect of proposed changes on progress schedule and coordination
    m. Other business relating to work

3.02 INTERPRETATION OF DRAWINGS:

A. Raceways and conductors for switches and other miscellaneous low voltage power and signal systems as specified are not shown on the Drawings. Raceways and conductors shall be provided as required for a complete and operating system. Refer to riser diagrams for signal system wiring.

B. The Contractor shall run all conduit and wire to PLC Termination Cabinets, where designated on the Drawings. The conduit and wire, as shown on the interface drawings, may not necessarily be shown on the floor plan.

C. Install conductors carrying low voltage signals (typically twisted shielded pair cables) in raceways totally separate from all other raceways containing power or 120-Volt control conductors, Refer to NEC article 725. DC and AC control wiring shall be installed in separate raceways.

D. Raceways and conductors for the fire alarm, sound and page party systems are not shown on the Drawings. Provide raceways and conductors as required by the system manufacturer for a complete and operating system. All raceways and power conductors shall be in accordance with Division 26. Raceways shall be installed concealed in all finished spaces and may be installed exposed or concealed in process spaces.

E. Redesign of electrical or mechanical work, which is required due to the Contractor's use of a pre-approved alternate instrumentation or control item, or arrangement of equipment and/or layout other than specified herein, shall be done by the Contractor at his/her own expense. Redesign and detailed plans shall be submitted to the Owner/Engineer for approval. No additional compensation will be provided for changes in the work, either his/her own or others, caused by such redesign.

3.03 INSTRUMENTATION EQUIPMENT PADS AND SUPPORTS:

A. Equipment pads and supports, of concrete or steel including structural reinforcing and foundations, are shown on the Structural Drawings.

3.04 SLEEVES AND FORMS FOR OPENINGS:

A. Provide and place all sleeves for conduits penetrating floors, walls, partitions, etc. Locate all necessary slots for Electrical and Instrumentation work and form before concrete is poured.

B. Obtain shop drawings and templates from equipment vendors or other subcontractors and locate the concealed conduit before the floor slab is poured.

C. Where setting drawings are not available in time to avoid delay in scheduled floor slab pours, the Owner/Engineer may allow the installations of such conduit to be exposed. Requests for this deviation must be submitted in writing. No additional compensation for such change will be allowed.

D. Seal all openings, sleeves, penetration and slots as specified in Division 26.

3.05 CUTTING AND PATCHING:

A. Cutting and patching shall be done in a thoroughly workmanlike manner. Saw cut all concrete and masonry prior to breaking out sections.

B. Core drill holes in concrete floors and walls as required. Contractor shall obtain written permission from the Owner/Engineer before core drilling any holes larger than 2 inches.

C. Install work at such time as to require the minimum amount of cutting and patching.

D. Do not cut joists, beams, girders, columns or any other structural members.

E. Cut opening only large enough to allow easy installation of the conduit.

F. Patching to be of the same kind and quality of material as was removed

G. The completed patching work shall restore the surface to its original appearance or better.

H. Patching of waterproofed surfaces shall render the area of the patching completely waterproofed.

I. Remove rubble and excess patching materials from the premises.

J. When existing conduits are cut at the floor line or wall line, they shall be filled with grout of suitable patching material.

3.06 INSTALLATION:

A. Any work not installed according to the Drawings and this Section shall be subject to change as directed by the Owner/Engineer. No extra compensation will be allowed for making these changes.

B. All dimensions shall be field verified at the job site and coordinated with the work of all other trades.

C. Equipment shall be protected at all times against mechanical injury or damage by water. Equipment shall not be stored outdoors. Equipment shall be stored in dry permanent shelters as required by each Specification Section. Do not install equipment in its permanent location until structures are weather-tight. If any apparatus has been subject to possible injury by water, Equipment shall be thoroughly dried out and tested as directed by the Owner/Engineer, or shall be replaced at no additional cost at the Owner/Engineer's discretion.

D. Equipment that has been damaged shall be replaced or repaired by the equipment manufacturer, at the Owner/Engineer's discretion.

E. Repaint any damage to the factory applied paint finish using touch-up paint furnished by the equipment manufacturer. If the metallic portion of the panel or section is damaged, the entire panel or section shall be replaced, at no additional cost to the Owner.

3.07 MANUFACTURER'S SERVICE:

A. Provide manufacturer's services for testing and start-up of the equipment as listed in each individual Specification Section.

B. Testing and startup shall not be combined with training. Testing and start-up time shall not be used for manufacturer's warranty repairs.

C. Check interlocking, control and instrument wiring for each system and/or part of a system to prove that the system will function properly as indicated by schematics, wiring diagrams and Control Descriptions.

D. Testing shall be scheduled and coordinated with the Owner/Engineer at least two weeks in advance. Provide qualified test personnel, instruments and test equipment.

E. Refer to the individual Instrumentation Equipment Sections for additional specific testing requirements.

F. Make adjustments to the systems and instruct the Owner's personnel in the proper operation of the systems.

3.08 TESTING:

A. Test systems and equipment furnished under Division 40 and repair or replace all defective work. Make adjustments to the systems and instruct the Owner's personnel in the proper operation of the systems.

B. Make the tests and checks prior to energizing instrumentation equipment in accordance with Section 40 61 21, and the individual Specification sections.

C. Testing shall be scheduled and coordinated with the Owner/Engineer at least two weeks in advance. Provide qualified test personnel, instruments and test equipment, including manufacturer's services, as specified in the individual Specification sections.

D. Where test reports show unsatisfactory results, the Owner/Engineer will require the removal of all defective or suspected materials, equipment and/or apparatus, and their replacement with new items, all at no cost to the Owner. The Contractor shall bear all cost for any retesting.

3.09 TRAINING:

A. The Contractor shall provide manufacturer's training as specified in each individual section of the Specifications.

END OF SECTION

SECTION 40 61 21
PROCESS CONTROL SYSTEM TESTING

PART 1 GENERAL

1.01 SCOPE

A. All testing shall be performed by the contractor and witnessed by GBRA.

B. All testing shall be arranged and paid for by the contractor.

C. Testing equipment must be calibrated within the previous 12 months.

D. Field and laboratory testing firms shall include GBRA on the distribution list for all test reports related to GBRA facilities.

E. Contractor shall perform pre-testing to verify passing results prior to requesting GBRA inspection.

F. Any work that fails testing must be corrected and retested.

G. Any work that is disturbed must be retested.

H. The Process Control Systems Integrator (PCSI) shall provide, in coordination with the ASP as required, all labor and materials necessary to coordinate and perform the testing of the Process Instrumentation and Control System as specified herein.

I. The Process Control Systems Integrator (PCSI) shall supervise and/or perform the requirements of this Section. As part of these services, the PCSI shall include, for those equipment items not manufactured by him, the services of an authorized manufacturer's representative to check the equipment installation and place that portion of the equipment in operation. The manufacturer's representative shall be thoroughly knowledgeable about the installation, operation, and maintenance of the manufacturer’s equipment.

J. The Contractor shall provide all test equipment necessary to perform the testing as specified herein.

K. All Process Instrumentation and Control System hardware and software shall be thoroughly tested to verify proper operation as an integrated system.

L. Any defects or problems found during the testing activities shall be corrected by the Contractor and then retested to demonstrate proper operation.

M. Check and confirm the proper installation of all instrumentation and control components and all cable and wiring connections between the various system components prior to placing the various processes and equipment into operation.

N. Conduct a complete system checkout and adjustment, tuning of control loops, checking operation functions, and testing of final control actions. All problems encountered shall be promptly corrected to prevent any delays in startup of the various unit processes.

O. The PCSI shall be responsible for initial operation of the Process Instrumentation and Control System and shall make any required changes, adjustment or replacements for operation, monitoring, and control of the various processes and equipment necessary to perform the functions intended.

P. All spare parts must be on site and accepted prior to commencement of field testing.

Q. The Contractor shall provide the following documentation for use during the testing activities:
   1. Complete panel schematic and internal point-to-point wiring interconnect drawings.
   2. Complete electrical control schematics in accordance with JIC standards.
   3. Complete panel layout drawings.
   4. Complete field wiring diagrams.
   5. Complete instrument loop diagrams.
   6. Completed Calibration/Recalibration Certificates for all field and panel devices that require adjustment or calibration.
   7. Contractor to provide a complete test procedure and I/O List.

R. Contractor shall provide one set of the above listed documentation for the Owner's personnel, one set for the Engineer’s use, one set for field use, and the required number of sets for the Contractor's use.

S. The drawings corrected and modified during testing shall form the basis for the "As-Built" record drawing requirement.

T. Contractor shall furnish to Engineer two copies of an installation inspection report certifying that all equipment has been installed correctly and is operating properly. The report shall be signed by authorized representatives of both Contractor and the system supplier.

1.02 GENERAL:

A. The PCSI shall test all equipment at the prior to shipment to the project site. Unless otherwise specified in the individual specification sections, all equipment provided by the PCSI shall be tested as a single fully integrated system as far as possible.

B. At a minimum, the testing shall include the following:
   1. Factory Testing
      a. Un-witnessed Factory Test (UFT)
      b. The Un-witnessed Factory Test shall be performed by the PCSI at his facility.
   2. Field Testing
      a. Operational Readiness Test (ORT)
         1) The Operational Readiness Test shall be a joint test performed by the PCSI and ASP, with coordination as required, with the electrical subcontractor and other subcontractors or equipment suppliers if needed.
      b. Functional Demonstration Tests (FDT)
         1) The Functional Demonstration Tests shall be performed by the PCSI in coordination with the ASP as necessary to demonstrate the system operating in compliance with the requirements of the Contract Documents. The FDT(s) shall be conducted by the PCSI and witnessed by the Owner’s representative(s) and the Engineer.

C. Each test shall be in the cause-and-effect format. The person conducting the test shall initiate an input (cause) and, upon the system's or subsystem's producing the correct result (effect), the specific test requirement shall be satisfied.

D. All tests shall be conducted in accordance with prior Engineer-approved procedures, forms, and check lists. Each specific test shall be described and followed by a section for sign off by the appropriate party after its satisfactory completion.

E. Copies of these sign off test procedures, forms, and check lists will constitute the required test documentation.

F. Provide all special testing materials and equipment. Wherever possible, perform tests using actual process variables, equipment, and data. Where it is not practical to test with real process variables, equipment, and data, provides suitable means of simulation. Define these simulation techniques in the test procedures.

G. The General Contractor shall require the Integration Subcontractor to coordinate all testing with the Engineer, all affected Subcontractors, and the Owner.

H. The Engineer reserves the right to test or retest all specified functions whether or not explicitly stated in the prior approved Test Procedures.

I. The Engineer's decision shall be final regarding the acceptability and completeness of all testing.

J. No equipment shall be shipped to the Project Site until the Engineer has received all test results and approved the system as ready for shipment.

K. The PCSI shall furnish the services of servicemen, all special calibration and test equipment and labor to perform the field tests.

L. Correction of Deficiencies:
   1. All deficiencies in workmanship and/or items not meeting specified testing requirements shall be corrected to meet specification requirements at no additional cost to the Owner.
   2. Testing, as specified herein, shall be repeated after correction of deficiencies is made until the specified requirements are met. This work shall be performed at no additional cost to the Owner.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.01 UN-WITNESSED FACTORY TESTS (UFT):

A. The entire system, except primary elements, final control elements, and field mounted transmitters, shall be interconnected and tested to ensure the system operates as specified. All analog and discrete input/output points not interconnected at this time shall be simulated to ensure proper operation of all alarms, monitoring devices/functions, and control devices/functions.

B. All panels and assemblies shall be inspected and tested to verify that they are in conformance with related submittals, specifications, and Contract Drawings.

C. During the tests all digital system hardware and software shall have operated continuously for five (5) days without a failure to verify the system is capable of continuous operation. The Un-Witnessed Factory Test results shall be submitted to the Engineer for approval prior to the scheduling of the Operational Readiness Test (ORT).

3.02 OPERATIONAL READINESS TESTS (ORT):

A. Prior to startup and the Functional Demonstration Test, the entire system shall be certified (inspected, tested, and documented) that it is ready for operation.

B. Once the contractor verifies the work is ready for demonstration testing, the contractor shall request GBRA to inspect the project. Within ten (10) business days after the inspection, GBRA will endeavor to provide a list of critical items that must be corrected prior to demonstration testing. After the contractor has corrected all critical items, the contractor shall request GBRA to inspect the project. Once all critical items are completed to GBRA's satisfaction,

Contractor shall:

1. retain the services of qualified manufacturer technical representatives to startup, test, and verify all devices, instruments, equipment, and systems are installed properly and are fully functional and calibrated;
2. submit all O&M manuals in accordance with Section 1.4 herein.

C. Loop/Component Inspections and Tests: The entire system shall be checked for proper installation, calibrated, and adjusted on a loop-by-loop and component-by-component basis to ensure that it is in conformance with related submittals and these Specifications.

1. The Loop/Component Inspections and Tests shall be implemented using Engineer approved forms and check lists.
    a. Each loop shall have a Loop Status Report to organize and track its inspection, adjustment, and calibration. These reports shall include the following information and check off items with space for sign off by the PCSI.
        1) Project Name
        2) Loop Number
        3) Tag Number for each component
        4) Check offs/sign offs for each component
    b. Tag/identification
    c. Installation
    d. Termination – wiring
    e. Calibration/adjustment – Check offs/sign offs for the loop
    f. Panel interface terminations
    g. I/O interface terminations
    h. I/O signal operation
    i. Inputs/outputs operational: received/sent, processed, and adjusted
    j. Total loop operation – Provide space for comments
    k. Each active Analog Subsystem element and each I/O module shall have a Component Calibration Sheet. These sheets shall have the following information, spaces for data entry, and a space for sign off by the PCSI:
        1) Project Name
        2) Loop Number
        3) Component Tag Number of I/O Module Number
        4) Component Code Number Analog System
        5) Manufacturer (for Analog system element)
        6) Model Number/Serial Number (for Analog system)
        7) Summary of Functional Requirements:
            a) Indicators: Scale
            b) Transmitters/Converters: Scale
            c) Computing Elements: Function
            d) Controllers: Action (direct/reverse) control Modes (PID)
            e) Switching Elements: Unit range, differential (FIXED/ADJUSTABLE), Preset (AUTO/MANUAL)
            f) I/O Modules: Input or output
2. Calibrations:

a. Analog Devices: Required and actual inputs and outputs at 0, 25, 50, 75, and 100 percent of span, rising and falling.
b. Discrete Devices: Required and actual trip points and reset points
c. Controllers: Mode settings (PID)
d. I/O Modules: Required and actual inputs or outputs for 0, 25, 50, 75, and 100 percent of span, rising and falling.
    1) Provide space for comments
    2) Space for sign off by the PCSI
    3) All measuring and/or recording devices and instruments shall be field calibrated by a licensed professional. Contractor shall arrange and pay for calibration and provide copies of calibration certificates to GBRA prior to demonstration testing.

3. The General Contractor shall require the PCSI to maintain the Loop Status Reports and Component Calibration Sheets at the job-site and make them available to the Engineer/Owner at any time.
4. These inspections and tests do not require witnessing. However, the Engineer shall review and initial all Loop Status Sheets and Component Calibration Sheets and spot-check their entries periodically and upon completion of the Operational Readiness Test. Any deficiencies found shall be corrected.
5. Once the contractor verifies the work is ready for demonstration testing, the contractor shall request GBRA to inspect the project. Within ten (10) business days after the inspection, GBRA will endeavor to provide a list of critical items that must be corrected prior to demonstration testing. After the contractor has corrected all critical items, the contractor shall request GBRA to inspect the project.

3.03 FUNCTIONAL DEMONSTRATION TEST (FDT):

A. Prior to startup and the 30-Day Test, the entire installed instrument and control system shall be certified that it is ready for operation. All preliminary testing, inspection, and calibration shall be complete as defined in the Operational Readiness Tests. The FDT will be a joint test by the PCSI and the Equipment suppliers.

B. Once all critical items are completed to GBRA's satisfaction, the contractor shall utilize clean water to perform demonstration testing. The demonstration testing must be witnessed by GBRA. During demonstration testing, contractor shall retain the services of qualified manufacturer technical representatives to demonstrate all devices, instruments, equipment, and systems are fully functional and calibrated. Contractor shall coordinate demonstration testing schedule, and any reschedule, with GBRA at least ten (10) business days in advance. Each specified function shall be demonstrated on a paragraph-by-paragraph and loop-by-loop basis.

C. Loop-specific and non-loop-specific tests shall be the same as specified under Functional Demonstration Tests except that the entire installed system shall be tested and all functionality demonstrated.

D. Updated versions of the documentation specified to be provided for during the tests shall be made available to the Engineer at the job-site both before and during the tests. In addition, one (1) copy of all O&M Manuals shall be made available to the Engineer at the job-site both before and during testing.

E. The daily schedule specified to be followed during the tests shall also be followed during the Functional Demonstration Test.

F. The system shall operate for 100 continuous hours without failure before this test shall be considered successful.

G. Simulate a loss of power condition and test each communications battery backup system for a minimum of four (4) hours duration and verify battery system low voltage alarm.

H. Demonstrate communication failure and recovery.

3.04 TRAINING:

A. General:
1. Contractor shall provide onsite training of GBRA operating personnel after successful operational demonstration testing of the entire project and each specified phase thereof.
2. The cost of training programs for the Owner's personnel shall be included in the Contract price. Where practical, the training and instruction shall be directly related to the system being supplied.
3. Training shall be conducted at the Owners facilities.
4. Contractor shall operate the facility, or specified phase thereof, with clean water during training.
5. All Technicians, Operators, Engineers, and Managers of the Facility shall require training on the Process Control System (PCS). The training courses shall address operation, maintenance, and troubleshooting of the system provided. The courses shall be designed specifically for the type of personnel attending, such as Operators, Engineers, etc.
6. All training schedules shall be coordinated with and at the convenience of the Owner. Contractor shall coordinate schedule, and any reschedule, with GBRA at least ten (10) business days in advance. Shift training may be required to correspond to the Owner's working schedule.
7. Provide detailed training manuals to supplement the training courses. The manuals shall include specific details of equipment supplied and operations specific to the project.
8. Contractor shall retain the services of qualified manufacturer technical representatives to conduct the training. These shall be the same manufacturer representatives who performed the respective field installation and functional testing services.
9. The trainer shall make use of teaching aids, manuals, slide/video presentations, etc. After the training services, all training materials shall be delivered to Owner.
10. The Owner reserves the right to videotape all training sessions. All training tapes shall become the sole property of the Owner.
11. All training must be complete prior to placing the facility, or specified phase thereof, into service and prior to issuing substantial completion.
12. Training shall be conducted after successful completion of demonstration testing of the entire project.
13. Contractor shall provide training for all devices, instruments, equipment, and systems.
14. Training shall not occur on the same day as testing.

B. Field Training:
1. Field Instruments:
a. Provide a minimum of one 8-hour hardware training and instruction on the maintenance of the field instrumentation for ten (10) of the Owners instrumentation technicians. This training shall be conducted after the Functional Demonstration Test. This training shall take place at the Owners facility. As a minimum the following shall be included:
1) Training in standard hardware maintenance for the instruments provided
2) Specific training for the actual instrumentation configuration to provide a detailed understanding of how the equipment and components are arranged, connected, and set up for this Contract.
3) Operating, test, adjustment, and calibration procedures
4) Troubleshooting and diagnosis

5) Periodic maintenance

2. Panel Instruments:
   a. Provide a minimum of one 8-hour hardware training and instruction in the maintenance of the panel instrumentation for ten (10) of the Owners technicians. Training should be conducted before the Functional Demonstration Test, but not more than one (1) month before and at a time suitable to the Owner. This training shall be provided at the Owners facility and at a minimum the following shall be included:
      1) Training in standard hardware maintenance for the instruments provided
      2) Specific training for the actual instrumentation configuration to provide a detailed understanding of how the equipment and components are arranged, connected, and configured for this Contract
      3) Operating, test, adjustment, and calibration procedures
      4) Troubleshooting and diagnosis
      5) Periodic maintenance

C. Scheduling of All Training Sessions Shall Be Coordinated with the Owner:
   1. Controller Software: This is for the SCADA Programmers
   2. One 4-training session shall be provided for the Owner's designated personnel on software.

END OF SECTION

SECTION 40 61 93
PROCESS CONTROL SYSTEM INPUT/OUTPUT LIST

PART 1 GENERAL

1.01 SCOPE

1. This Section includes the Input/Output List.

1.02 RELATED SECTIONS:

A. Section 407000 Instrumentation for Process Systems including coordination meeting required between various parties involved with controls programming.

B. GBRA Design Guidelines Specification 13410 Process Control Descriptions

1.03 SYSTEM DESCRIPTION:

A. The Input/Output List provides the minimum physical signal requirements of the control loops represented in the Contract Documents. Additional software integrated signals as required to fully implement the strategies as described in these specifications shall be included.

B. The Input/Output List is not intended to be an inclusive listing of all elements and appurtenances required to execute loop functions, but is rather intended to supplement and complement the drawings and other specification sections. The Input/Output List shall not be considered equal to a bill of materials.

C. Provide instrumentation hardware and software as necessary to perform control functions specified herein and as shown on drawings.

1.04 INPUT OUTPUT LISTING:

A. The Input/Output List follows in Appendix A.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.01 INSTALLATION:

A. All inputs and outputs listed shall be programmed in the system as specified herein and shall be installed, field adjusted and tested as an integral part of equipment specified elsewhere in these Specifications.

END OF SECTION

I/O LIST - City of Boerne Ammann Road GBRA Water Main Extension Project								
Item No.	**P&ID**	**Parameter**	**Digital Input**	**Digital Output**	**Analog Input**	**Analog Output**	**Modbus Serial**	**Ethernet IP**
Flow								
		Flow Rate, Totalized Flow					X	
Pressure								
		Delivery Pressure			X			
Modulating Valve								
		Valve in Open Position	X					
		Valve in Closed Position	X					
		Valve Position Indication			X			
		Valve Control in Remote Position	X					
		Valve Open Command		X				
		Valve Close Command		X				
		Flow Setpoint to Valve Controller				X		
Level								
		GST Level from Pump Station			X			
Miscellaneous								
		SCADA Panel Intrusion Alarm	X					
		VAC Power Fail	X					
		UPS Battery Alarm	X					
		Battery Level %, Battery Alarm, UPS Alarms						X
		Point Count	**6**	**2**	**3**	**1**		

SECTION 40 61 95
APPLICATION SERVICES

PART 1 GENERAL

1.01 SCOPE

A. The PCSI shall furnish the services of qualified personnel to perform the work as defined herein, in the Related Work Paragraph of this Section, and other Specification Sections as specified herein. The service personnel shall be referred to as the Application Services Programmer (ASP). The pre-qualified ASP shall be as specified is Section 40 61 13.

B. It shall be the responsibility of the PCSI to obtain and provide any and all information required from other Divisions, as listed in the related work below, to complete the work under this Section.

C. The ASP shall be responsible for providing all new applications programming and configuration services of the Owner's existing SCADA control system to accomplish the control and monitoring functions as described in the Contract Documents. The ASP shall provide all programming functions including, but not limited to, control strategies and communications for the pump station PCS PLC controller and HMI. The ASP shall also provide all applications programming and configuration services necessary to produce the HMI (graphic displays, reports, trends, historical archive, etc.) as described in the contract specifications and drawings.

D. The ASP shall modify distributions calculations in the High Service PLC at the Western Canyon Water Treatment Plant. The ASP shall coordinate with GBRA to accurately modify these calculations to include the added delivery point at Ammann Road.

E. Application services programmer shall be certified by Inductive Automation for HMI software. Contractors shall be gold level certified. Integration must be performed by employees that are gold level certified, experienced, and competent in the implementation of Ignition HMI software. Submit certifications, qualifications, and experience for GBRA review and approval.

F. The ASP shall provide all modifications to the control system database, control logic, graphic screens, etc. required to correctly reflect the addition of equipment and instruments, including, but not limited to pressure transmitters, flow meters and other equipment and instruments included under the scope of this Contract.

G. At a minimum the ASP shall:
   1. Provide for and test communications and functionality between new instrumentation and PLC.
   2. Configure and test data collection and interactivity between all software packages and Operator Workstations and Servers in order to provide a comprehensive working system of data collection, storage and reporting.
   3. All Applications Software Development and Programming shall be performed in accordance with the Owner's pre-established programming conventions.
   4. All Applications Software Development and Programming (i.e., graphics screens, configurations, and associated attributes) shall be performed at the ASP facility before being loaded in the field on the existing system.
   5. All Applications Software Development and Programming shall be performed by ASP approved personnel.
   6. All commands issued at the Control System (equipment start/stop, reset, set point entry, etc.) shall be security protected.

7. ASP shall perform back-ups of the Control System prior to loading graphical screens, configurations, and associated attributes to Control System. The ASP shall coordinate with GBRA.
8. ASP shall ensure that data is free of viruses, malware, adware, spyware, etc. or any other malicious programs prior to loading graphical screens, configurations, and associated attributes to the control system the ASP shall coordinate with GBRA.

1.02 RELATED WORK:

A. Mechanical Equipment Division

B. Electrical Equipment Division
1. Section 40 61 13 Process Control System General Provisions
2. Section 40 61 21 Process Control System Testing
3. Section 40 61 93 Input/Output List
4. Section 40 63 43 Programmable Logic Controller (PLC)
5. Section 40 67 00 Control System Equipment Panels
6. Section 40 70 00 Instrumentation for Process Systems
7. Section 40 78 00 Panel Mounted Equipment

1.03 SUBMITTALS:

A. Pre-submittal Conference:
1. Prior to the Submittal Process, the Application Services Provider (ASP) shall hold workshops, in which the Engineer and Owner may observe the displays and control strategies prior to submitting database, trends, graphics, reports, and control strategies. No display generation, programming, etc. shall begin until standards have been approved.
2. Prior to commencement of any applications work, the ASP shall submit and receive approval from the Owner and Engineer for all required I/O Lists.

B. Submittal Process:
1. Submittals shall be made in accordance with the requirements of Division 1, Section 40 61 13, and as specified herein.
2. All electronic submittals shall be submitted in an ISO/IEC 26300:2006 or Comma Separated Values (CSV) readable electronic file format on a CD-Rom and an 8 ½-inch by 11-inch hard copy. Programs shall be submitted in the native format of the PLC as suggested by the manufacturer.

C. Submittal Content:
1. Submittals shall contain the following:
a. Controller Programming:
1) I/O List with register assignments. I/O tags shall be assigned by the ASP and shall conform with GBRA existing I/O tagging format.
2) Diagrams of the process control functions by each strategy.
3) Listing of inputs to the control function.
4) A short narrative of each control strategy.
5) Listing of all Operator inputs and outputs to and from the control function. Any special displays related to the function shall be illustrated. A description of the operation of any display shall be described as it relates to the control function.
6) Cross references of all I/O, showing to which I/O modules or software modules, they are in.
7) Failure contingencies shall be described in detail.
8) An annotated program, submitted in both hard copy and electronic format.
b. Human Machine Interface Programming:

1) I/O List with register assignments. I/O tags shall be assigned by the ASP and shall conform with GBRA existing I/O tagging format.
2) Displays for each process area including all necessary pop ups.
3) Listing of data points on each display.
4) A short narrative of each control usage.
5) Listing of all Operator inputs and outputs to and from the control function. Any special displays related to the function shall be illustrated. A description of the operation of any display shall be described as it relates to the control function.
6) Cross references of all I/O, showing which software module at each point used.
7) Failure contingencies shall be described in detail.
8) A complete listing of all historical points.
9) Listing of all required configuration files for each SCADA client.

2. Submit a proposed Schedule of Work.

1.04 REFERENCE CODES AND STANDARDS:

A. Instrumentation equipment, materials and installation shall comply with the National Electrical Code (NEC and with the latest edition of the following codes and standards:
1. National Electrical Safety Code (NESC)
2. Occupational Safety and Health Administration (OSHA)
3. NEMA ICS 1-101 Diagrams, Designations and Symbols
4. ANSI/ISA-5.06.01-2007 - Functional Requirements Documentation for Control Software Applications.
5. ISA-TR20.00.01-2001 - Specification Forms for Process Measurement and Control Instruments Part 1: General Considerations Updated with 27 New Specification Forms in 2004-2005.
6. ISA-5.4-1991 Instrument Loop Diagrams.
7. ISA-5.5-1985 Graphic Symbols for Process Displays.
8. ISA-5.1-1984 (R1992) Instrumentation Symbols and Identification.
9. 9SA-5.3-1983 Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic, and Computer Systems.
10. ISA-20-1981 Specification Forms for Process Measurement and Control Instruments, Primary Elements, and Control Valves.
11. ISA-5.2-1976 (R1992) Binary Logic Diagrams for Process Operations
12. NEMA ICS 6 Enclosures for Industrial Controls and Systems
13. National Fire Protection Association (NFPA)
14. National Electrical Manufacturers Association (NEMA)
15. American National Standards Institute (ANSI)
16. Insulated Cable Engineers Association (ICEA)
17. International Society of Automation (ISA)
18. Underwriters Laboratories (UL)
19. UL 508, the Standard of Safety for Industrial Control Equipment
20. UL 508A, the Standard of Safety for Industrial Control Panels
21. UL 50, the Standard of Safety for Enclosures for Electrical Equipment
22. NFPA 79, Electrical Standard for Industrial Machinery
23. Factory Mutual (FM)
24. NFPA 70 National Electrical Code (NEC)
25. NFPA 70E Standard for Electrical Safety in the Workplace
26. ANSI C37.90.2 Standard Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers
27. NEMA ICS 4 Terminal Blocks for Industrial Use

28. NEMA LS1 Low Voltage Surge Protection Devices
29. UL 1283 Standard for Safety-Electromagnetic Interference Filters
30. UL 1449 Third Edition Surge Protective Devices
31. Texas Electrical Code

B. All equipment and installations shall conform to applicable Federal, State, and local codes. All equipment shall comply with the requirements of the National Electric Code and Underwriters Laboratories (UL) where applicable. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 WARRANTY:

1. Provide minimum 1-year equipment warranty which begins after final acceptance of facility. Refer to the requirements of Division 1.

1.06 SYSTEM FINAL DOCUMENTATION

A. Prior to final acceptance of the system and owner training, operating and maintenance manuals covering instructions on the operation and maintenance on each type of equipment shall be furnished in accordance with the City of Boerne Standard Specification Section 01340 – Submittals.

B. The documents shall be provided bound in three ring binders with Drawings reduced or folded for inclusion. In addition, documentation shall be provided in electronic format, either in MS Word or Excel, as applicable. Submit electronic files on CD, DVD or USB drive.

C. As a minimum, the following information shall be provided:
1. A comprehensive index.
2. A complete "As Constructed" set of approved shop Drawings.
3. A complete list of the equipment supplied, including serial numbers, ranges, and pertinent data.
4. Full specifications on each item.
5. System schematic drawings "As Constructed," illustrating all components, piping and electrical connections of the systems supplied under this Section.
6. Detailed service, maintenance and operation instructions for each item supplied.
7. Special maintenance requirements particular to this system shall be clearly defined, along with special calibration and test procedures.
8. Operating instructions which incorporate a functional description of the entire system with references to the systems schematic Drawings and instructions.
9. Complete parts lists with stock numbers and name, address, and telephone number of the local supplier.

D. The final documentation shall be new documentation written specifically for this project, but may include standard and modified standard documentation. Modifications to existing hardware or software manuals shall be made on the respective pages or inserted adjacent to the modified pages. All standard documentation furnished shall have all portions that apply clearly indicated. All portions that do not apply shall be lined out.

E. The manuals shall contain all illustrations, detailed drawings, wiring diagrams, and instructions necessary for installing, operating, and maintaining the equipment. The illustrated parts shall be numbered for identification. All information contained therein shall apply specifically to the equipment furnished and shall only include instructions that are applicable. All such illustrations shall be incorporated within the printing of the page to form a durable and permanent reference book.

F. If the PCSI's ASP transmits any documentation or other technical information which he considers proprietary, such information shall be designated. Documentation or technical information which is designated as being proprietary will be used only for the design, construction, operation, or maintenance of the System and, to the extent permitted by law, will not be published or otherwise disclosed.

G. The requirements for the final documentation are as follows:
   1. As built documentation shall include all previous submittals, as described in this Specification, updated to reflect the as built system as well as any corrections or modifications to the System resulting from the Factory and/or Functional Demonstration Tests.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.01 COORDINATION MEETINGS:

A. The ASP shall be responsible to coordinate the work with the PCSI and/or the Contractor. He shall schedule and administer a minimum of two (2) coordination meetings for the purpose of discussing progress of the work under this Section. The ASP shall make arrangements for the meetings and prepare and send a proposed agenda to all participants at least two (2) weeks before scheduled meetings. The ASP shall be responsible for promptly preparing and distributing meeting minutes to all attendees.

B. The meetings shall be held at the Owner's designated location and shall include, at a minimum, attendance by the Owner, Engineer, General Contractor's project engineer, ASP, and PCSI if necessary.
   1. The First Coordination Meeting shall be held in advance of the first ASP Shop Drawing submittal. The first meeting may run concurrent to a PCSI coordination meeting, if desired and timed to meet all other contract requirements. The purpose of the first meeting shall be for the ASP to:
      a. Summarize their understanding of the project
      b. Discuss any proposed deviations, substitutions or alternatives
      c. Present the ASP project schedule
      d. Schedule testing and delivery milestone dates
      e. Provide a forum for the ASP and Owner to coordinate hardware and software related issues
      f. Request any additional information required from the Owner and/or Engineer
      g. The ASP shall bring a draft version of shop drawings to the meeting to provide the basis for the Owner/Engineer's input into their development
      h. Discuss format of required reports to be developed
   2. The Second Coordination Meeting shall be held after all ASP shop drawings have been reviewed and returned to the ASP. Attendance by the Owner, Engineer, General Contractor's project engineer, ASP, and PCSI shall be required. The purpose of the second meeting shall be for the ASP to:
      a. Discuss comments made during submittal process
      b. Refine schedule milestone dates
      c. Coordinate installation activities
      d. Discuss any remaining coordination requirements
   3. A typical agenda may include, but shall not be limited to, the following:
      a. Review minutes of previous meetings

b. Review of work progress
c. Field observations, problems, and decisions
d. Identification of problems which may impede planned progress
e. Review of submittal schedule and submittal status
f. Review of offsite fabrications and delivery schedules
g. Maintenance of progress schedule
h. Corrective measures to regain projected schedules
i. Planned activities for subsequent work period
j. Coordination of projected progress
k. Maintenance of quality and work standards
l. Effect of proposed changes on progress schedule and coordination
m. Other business relating to work

3.02 TESTING:

A. Refer to Section 40 61 21.

3.03 OPERATIONAL READINESS TEST (ORT):

A. Refer to Section 406421.

B. Each active Analog Subsystem element and each I/O module shall have a Component Calibration Sheet. These sheets shall have spaces for data entry, space for sign off by the ASP and the PCSI, and the following information:
1. Project Name
2. Loop Number
3. Component Tag Number of I/O Module Number
4. Component Code Number Analog System
5. Manufacturer (for Analog system element)
6. Model Number/Serial Number (for Analog system)
7. Summary of Functional Requirements:
a. Indicators: Scale
b. Transmitters/Converters: Scale
c. Computing Elements: Function
d. Controllers: Action (direct/reverse) control Modes (PID)
e. Switching Elements: Unit range, differential (FIXED/ADJUSTABLE), Preset (AUTO/MANUAL)
f. I/O Modules: Input or output
8. Calibrations:
a. Analog Devices: Required and actual inputs and outputs at 0, 25, 50, 75 and 100 percent of span, rising and falling
b. Discrete Devices: Required and actual trip points and reset points
c. Controllers: Mode settings (PID)
d. I/O Modules: Required and actual inputs or outputs for 0, 25, 50, 75 and 100 percent of span, rising and falling
e. Space for comments
f. Space for sign off by the General Contractor

3.04 FUNCTIONAL DEMONSTRATION TEST (FDT):

A. Refer to Section 40 61 21.

3.05 TRAINING:

A. General:

1. The cost of Owner training programs shall be included in the Contract price. The training and instruction, insofar as practicable, shall be directly related to the system being supplied. The training program shall represent a comprehensive program covering all aspects of the operation and maintenance of the system.
2. All instructors shall be intimately familiar with the operation and control of the Owner's facilities.
3. Training shall be provided to accommodate shift personnel. Coordinate with Owner.
4. Owner reserves the right to record (video and/or audio) all training sessions. All training tapes shall become the sole property of the Owner.

B. Maintenance Training

C. Refer to Section 40 61 21 for additional training requirements

D. Scheduling of all training sessions shall be coordinated with the Owner:
   1. Controller Software:
      a. The training and instruction, insofar as practicable, shall be directly related the System being supplied. The training shall include a field training program consisting of hands-on instruction utilizing the Owner's System.
      b. One 2-day training session shall be provided for the Owner's designated personnel on software and hardware operation and maintenance at the Owner's facility. Software training shall provide classroom and hands-on instruction such that a student with experience in process instrumentation can configure the system with no guidance or with only minimal supervision when attempting complex problems. The training shall cover the following subjects as a minimum:
         1) System overview covering the basic system design and purpose
         2) System hardware covering the specific hardware elements and specific equipment arrangements provided are covered.
         3) Specific application configuration instruction shall cover the overall design and implementation of the applications as provided under this Contract The intent shall be to make the student fully knowledgeable in all aspects the system provided, along with methods for making additions, modifications, and deletions to the process system.
         4) Development of new control loops and strategies
         5) Complete system backup and reload procedures
      c. These courses shall not be concurrent with those offered by the PCSI. The above listing is only a guide and is not intended to be complete.
   2. Operator Interface Software
      a. Refer to Section 40 61 21 for additional training requirements.
   3. Operator Training
      a. Refer to Section 40 61 21 for additional training requirements.
   4. Operator field training sessions shall include the following:
      a. Operator field training shall be structured specifically for operations type personnel. The ASP and PCSI shall be prepared to answer any questions the Operators may ask regarding pump station operation via the Control System. Training personnel shall be prepared to walk-through the logic used to control the equipment and how the Control System executes that logic. Training personnel shall be prepared to show the Operators how to operate the pump station from the Control System level in the event of Control Room equipment failure. Additionally, such topics as changing printer ribbon, changing printer or video copier paper, printing reports on demand, copying graphic displays, signing onto the system, creating graphic generated trends, etc. shall be discussed.

b. The ASP and PCSI shall, at a minimum, have the following teaching aids available for distribution during pump station Operator field training sessions:
    1) Copies of all complete generated graphic displays and reports

5. Operator Interface Functions:
    a. Provide a minimum of two separate 2-day training sessions as scheduled by the Owner for the Owner's designated operations personnel on the detailed operation of the Operator Work Station Controls. This training should be conducted within two weeks of the completion of the Functional Demonstration Test at a time suitable to the Owner. This training shall be provided at the Owner's facility and as a minimum include the following:
        1) Specific training for the actual instrumentation configuration to provide a detailed understanding of how the equipment and components are arranged, connected, and set up for this Contract.
    b. Provide a minimum of four (4) days of instructor on-call tutoring services. After the completion of the training sessions described above, the instructor shall be at the site to provide these services.

END OF SECTION

SECTION 40 61 96

PROCESS CONTROL DESCRIPTIONS

PART 1 GENERAL

1.01 DESCRIPTION

A. The delivery point site delivers water to the GVSUD Pump Station on a daily rate basis. This daily rate shall be used as the set point to adjust the control valve to maintain the flow rate.

B. Related Sections:

1. Section 40 61 95 Application Services
2. Section 40 70 00 Instrumentation for Process Systems
3. Section 40 67 00 Control System Equipment Panels
4. Section 40 78 00 Panel Mounted Equipment
5. Section 40 61 93 Input/Output List
6. Section 40 63 43 Programmable Logic Controller (PLC)
7. Section 40 61 21 Process Control System Testing

PART 2 PRODUCTS

2.01 CONTROL VALVE

One (1) control valve will be installed at the delivery point. The valve will operate using the following control modes:

Local Manual

- When the L/O/R switch on the valve pushbutton station is in LOCAL position, operators can locally open, close or stop the valve.

Local Automatic

- None.

Remote Manual:

- When the L/O/R switch is in remote position, the HMI operator shall be able to select AUTO/MANUAL mode. In the MANUAL position the valve shall be opened and closed by adjusting the percent open set point. The valve shall close when the Ammann Road Ground Storage tank level reaches a pre-determined level setpoint.

Remote Automatic:

- When the L/O/R switch is in remote position and the mode is set to AUTO at the HMI, the valve shall modulate to control the flow rate. The flow rate set point shall be the customer daily rate set from the water treatment plant control system. The modulation shall use a PID control algorithm.
- If the customer enable is off, if the Ammann Road Ground Storage Tank level reaches a pre-determined level setpoint or if a system shutdown occurs, the valve will be closed. When a shutdown occurs, the valve shall ramp closed on an adjustable rate.

This "time to close" setpoint shall be operator adjustable via HMI from 1.0 to 30.0 minutes. The customer enable shall be a local control function.

SCADA Interface:

- The PLC sends a signal to the GBRA Control Room for the following valve status and alarm points:
    - Control Valve Position
    - Control Valve Fail: Valve fail alarm shall be generated when the valve position disagrees with the command position while in the remote mode. The fail alarm shall have a time delay and dead band adjustment.

2.02 PRESSURE TRANSMITTER

One (1) pressure indicating transmitter will be installed.

Local Manual

- The operator can read the pressure at the transmitter display.

Local Automatic

- None.

Remote Manual:

- None.

Remote Automatic:

- None.

SCADA Interface:

- The PLC sends a signal back to the GBRA Control Room indicating the delivery point pressure.
- High and low pressure alarms shall be generated at the PLC based on pressure input compared with pre-determined setpoint and sent to the GBRA Control Room.

2.03 ELECTROMAGNETIC TYPE FLOWMETER

One (1) flowmeter will be installed

Local Manual

- Operators can locally see a flow reading at the flowmeter panel.

Local Automatic

- None.

Remote Manual:

- None.

Remote Automatic:

- None.

SCADA Interface:

- The PLC sends a signal back to the GBRA Control Room indicating the real-time and summation of flow.
- The flowmeter will send data via Modbus to the PLC.
- High and low flow alarms shall be generated at the PLC based on flow input compared with pre-determined setpoint and sent to the GBRA Control Room.
- The daily total flow shall be generated from the flow rate reading. This total shall be from midnight to midnight and stored locally in the PLC. At midnight the local PLC shall store the previous day total as the yesterday total.

2.04 DOOR SWITCH:

The SCADA system monitors the door switch on the RTU panel.

Local Manual

- None .

Local Automatic

- None.

Remote Manual:

- None.

Remote Automatic:

- None.

SCADA Interface:

- The PLC monitors the status of the RTU panel door and sends a notification to the GBRA Control Room when the door is opened.

2.05 UPS

Local Manual

- None.

Local Automatic

- None.

Remote Manual:

- None.

Remote Automatic:

- None.

SCADA Interface:

- The PLC monitors the UPS battery status and sends a notification to the GBRA Control Room when there is a battery alarm.

2.06 POWER LOSS RELAY:

Local (Manual)

- None.

Remote Manual

- None.

Remote Automatic

- None.

SCADA Interface

- The PLC monitors the status of a relay and sends a notification to the GBRA Control Room when power is lost.

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 40 63 43
PROGRAMMABLE LOGIC CONTROLLER

PART 1 GENERAL

1.01 SCOPE OF WORK:

A. This Section of the Specifications describes the requirements for a Programmable Logic Controller (PLC) to be furnished under other Sections of the Specifications as listed in the Related Work paragraph of this Section.

B. All equipment described herein shall be submitted and furnished as an integral part of equipment specified elsewhere in these Specifications.

1.02 COORDINATION

A. Prior to performing any SCADA work, the contractor shall coordinate with GBRA personnel to schedule a SCADA pre-construction meeting. Refer to specification 40 61 13 for all required meetings.

B. The contractor shall perform all necessary programming development, and integration at GBRA's Western Canyon WTP control room.

1.03 RELATED WORK:

A. Section 26 01 00 Basic Electrical Requirements

B. Section 40 70 00 Instrumentation for Process Systems

C. Section 40 67 00 Control System Equipment Panels

D. Section 40 78 00 Panel Mounted Equipment

1.04 SUBMITTALS:

A. Submittals for equipment specified herein shall be made as a part of equipment furnished under other Sections. Individual submittals for equipment specified herein will not be accepted and will be returned un-reviewed.

B. Shop Drawings:
   1. Bill of Materials
   2. Catalog Cuts
   3. Component Data Sheets
   4. Panel Construction Drawings, including wiring and component layout
   5. List of Labels and Tags

C. Submit control loop drawings complete with rack, card slot and point configuration.

D. Submit catalog data sheets for all software licenses provided under this Specification Section.

E. Operation and Maintenance Manuals:
   1. Operation and Maintenance manuals shall include the following information:
      a. Manufacturer's contact address and telephone number for parts and service.
      b. Instruction books and/or leaflets
      c. Recommended renewal parts list
      d. Record Documents for the information required by the Submittals above.
      e. Copy of the software license data including serial numbers, license key, etc.
      f. Complete set of as-built control loop and wiring drawings in "11x17" format.

F. After completion of all SCADA punch list items, submit for approval, backup copies of programming and design for all PLC's, OIT's, and HMI's. Once approved, provide Owner with USB drive of all backup programming.

1.05 REFERENCE CODES AND STANDARDS:

A. PLC equipment, materials and installation shall comply with the National Electrical Code (NEC and with the latest edition of the following codes and standards:
   1. National Electrical Safety Code (NESC)
   2. Occupational Safety and Health Administration (OSHA)
   3. NEMA ICS 1-101 Diagrams, Designations and Symbols
   4. ANSI/ISA-5.06.01-2007 - Functional Requirements Documentation for Control Software Applications.
   5. ISA-TR20.00.01-2001 - Specification Forms for Process Measurement and Control Instruments Part 1: General Considerations Updated with 27 New Specification Forms in 2004-2005.
   6. ISA-5.4-1991 Instrument Loop Diagrams.
   7. ISA-5.5-1985 Graphic Symbols for Process Displays.
   8. ISA-5.1-1984 (R1992) Instrumentation Symbols and Identification.
   9. ISA-5.3-1983 Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic, and Computer Systems.
   10. ISA-20-1981 Specification Forms for Process Measurement and Control Instruments, Primary Elements, and Control Valves.
   11. ISA-5.2-1976 (R1992) Binary Logic Diagrams for Process Operations.
   12. NEMA ICS 6 Enclosures for Industrial Controls and Systems
   13. National Fire Protection Association (NFPA)
   14. National Electrical Manufacturers Association (NEMA)
   15. American National Standards Institute (ANSI)
   16. Insulated Cable Engineers Association (ICEA)
   17. International Society of Automation (ISA)
   18. Underwriters Laboratories (UL)
   19. UL 508, the Standard of Safety for Industrial Control Equipment
   20. UL 508A, the Standard of Safety for Industrial Control Panels
   21. UL 50, the Standard of Safety for Enclosures for Electrical Equipment.
   22. NFPA 79, Electrical Standard for Industrial Machinery
   23. Factory Mutual (FM)
   24. NFPA 70 National Electrical Code (NEC)
   25. NFPA 70E Standard for Electrical Safety in the Workplace
   26. ANSI C37.90.2 Standard Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers.
   27. NEMA ICS 4 Terminal Blocks for Industrial Use.
   28. NEMA LS1 Low Voltage Surge Protection Devices.
   29. UL 1283 Standard for Safety-Electromagnetic Interference Filters.
   30. UL 1449 Third Edition Surge Protective Devices
   31. Texas Electrical Code
   32. All equipment and installations shall conform to applicable Federal, State, and local codes.

B. All equipment shall comply with the requirements of the National Electric Code and Underwriters Laboratories (UL) where applicable.

C. Each specified device shall also conform to the standards and codes listed in the individual device paragraphs.

1.06 QUALITY ASSURANCE:

A. The manufacturer of this equipment shall have produced similar equipment for a minimum period of five (5) years. When requested by the OWNER/ENGINEER, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

B. Requirements of the CONTRACTOR:
   1. Have a local office within one hundred (100) miles of the City of Boerne or have technicians available on-site within 4 hours of emergency notification.
   2. Be able to provide resumes, project experience history and references for all employees that will be qualified to work on the SCADA system.
   3. Have a local full-time staff of employees that have developed and commissioned a minimum of three new Allen Bradley based systems within the past twelve months. Must have a minimum five years' experience designing, installing and commissioning SCADA systems.
   4. Have a minimum of three full time employees qualified to perform the SCADA system configuration work.
   5. All proposals submitted must be accompanied by documentation supporting the qualifications of the CONTRACTOR as detailed above.

C. Equipment submitted shall fit within the space or location shown on the Drawings. Equipment which does not fit within the space or location is not acceptable.

D. For the equipment specified herein, the manufacturer shall be ISO 9001 2000 certified.

1.07 WARRANTY:

A. At a minimum, the manufacturer and contractor shall provide warranty certificates valid for one (1) year from date of project final acceptance.

B. Within such period of warranty, the Manufacturer shall promptly furnish all material and labor necessary to return the equipment to new operating condition. Any warranty work requiring shipping or transporting of the equipment shall be performed by the CONTRACTOR at no expense to the OWNER.

PART 2 PRODUCTS

2.01 PROGRAMMABLE LOGIC CONTROLLER:

A. Approved Products – NO SUBSTITUTIONS:

DESCRIPTIONS	MANUFACTURER	PART NUMBER
PLC CPU (Processor)	Allen Bradley	5069-L306ER
16 Channel Digital Input Module	Allen Bradley	5069-IB16
16 Channel Digital Output Module	Allen Bradley	5069-OB16
8 Channel Analog Input Module	Allen Bradley	5069-IF8
2 Channel Analog Output Module	Allen Bradley	5069-OF4
Communications Adapter Card	Allen Bradley	5069 Serial Module

B. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions.

C. Serial port, and USB programming port shall be provided on the CPU (Processor).

D. Programming: Per GBRA "PLC Programming and Best Practices"

E. Physical Construction:
   1. The PLC shall be of the modular construction, consisting of a back plane, processor, I/O connections with additional plug in modules for analog I/O and communication modules as required.
   2. The power supply for the RTU panel components shall be 24 Volt 60 Hz, and shall be sized for the total cards; including the power requirement of the spare I/O rack slots.
   3. Analog inputs and outputs shall be isolated physically and electronically from each other, and shall be of the 4-20mA type.
   4. Discrete inputs shall be 24VDC and individually buffered with relays.
   5. Discrete outputs shall be individually buffered with external relays.
   6. Surge protective device for power main shall be Phoenix Contact EMC filter surge protection device mounted using DIN-rail assembly in the SCP, P/N 2856702.

F. Spare Equipment:
   1. Provide one (1) spare PLC.
   2. Provide minimum of 20 percent wired spare I/O channels of each type provided.
   3. Provide 1 spare I/O card of each type provided.
   4. Provide one (1) spare communication module of each type.
   5. Provide one (1) spare OIT/HMI.
   6. Provide one (1) spare network switch.

2.02 ADDITIONAL SPARE PARTS:

A. Provide the following spare parts for the PLC in the quantities specified:
   1. At a minimum, provide 30% of each fuse size and type.
   2. Provide one (1) electronic backup copy of programming.

B. Spare parts shall be boxed or packaged for long term storage. Identify each item with manufacturer's name, description and part number on the exterior of the package.

PART 3 EXECUTION

3.01 INSTALLATION

A. All equipment specified herein shall be factory installed, programmed, field adjusted, tested and cleaned as an integral part of equipment specified elsewhere in these Specifications.

END OF SECTION

SECTION 40 67 00
CONTROL SYSTEM EQUIPMENT PANELS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish and install fully functional SCADA panel to manually or automatically operate the metering station as specified in the detailed requirements of this Section, and logic and schematics as shown on the Electrical and Instrumentation Drawings.

B. Control panels as specified in Electrical Equipment Division or Mechanical Equipment Divisions, except as specifically stated herein shall not be submitted under this Section.

C. Provide the following SCADA panel as depicted in the Drawings and as specified herein.

1.02 RELATED WORK:

A. Division 26

B. Section 40 61 13 Process Control System General Provisions

C. Section 40 70 00 Instrumentation for Process Systems

D. Section 40 63 43 Programmable Logic Controller (PLC)

E. Section 40 78 00 Panel Mounted Equipment

1.03 SUBMITTALS:

A. Submittal Process:
   1. Submittals shall be made in accordance with the requirements of the City of Boerne Standard Specification Section 01340, Section 40 61 13 and as specified herein.
   2. Submittals require information on related equipment to be furnished under this Specification, and described in the related Sections listed in the Related Work paragraph above. Incomplete submittals not containing the required information on the related equipment will be returned un-reviewed.

B. Submittal Content:
   1. The original equipment manufacturer shall create all equipment shop drawings, including all wiring diagrams, in the manufacturer's Engineering department. All equipment shop drawings shall bear the original equipment manufacturer logo, drawing file numbers, and shall be maintained on file in the original equipment manufacturers archive file system. Photocopies of the Engineer's ladder schematics are unacceptable as shop drawings.

C. Required Submittals:
   1. Copies of previously Approved Related Work submittals
   2. Documentation confirming that the Panel Assembly Facility is a UL-508 certified panel shop
   3. Facsimile of the UL label that is to be applied to the completed panels
   4. Shop Drawings:
      a. Shop Drawings shall include the following:
         1) Drawings shall be to scale and shall show the location of panel mounted devices, including doors, louvers, and sub panels

2) Equipment outline drawings showing elevation, plan and interior views, front panel arrangement, dimensions, weight, shipping splits, conduit entrances and anchor bolt pattern. Indicate all options, special features, ratings and deviations from this Section's requirements.
3) The first sheet of each Panel Drawing Packet shall contain a Bill of Materials for that panel. The Bill of Materials shall list all devices mounted within the panel, and shall include the tag number, description, manufacturer, and model number of each item.
4) Following the Bill of Material shall be a listing, uniquely identifying each component of the Panel, and a description of the item used i.e., devices by their assigned tag numbers, nameplate inscriptions, service legend, and annunciator inscriptions.
5) Power and control schematics including external connections. Show wire and terminal numbers and color-coding.

b. Interconnecting Wiring Diagrams:
1) Provide interconnecting wiring diagrams showing electrical connections between equipment, consoles, panels, terminal junction boxes, and field mounted components.
2) Diagrams shall show component and panel terminal board identification numbers, and external wire and cable numbers.
3) Circuit names corresponding to the Circuit and Raceway Schedule shall be shown. The diagram shall include intermediate terminations between field elements and panels (e.g., terminal junction boxes, pull boxes, etc.).

5. Factory Tests:
a. Submittals shall be made for factory tests as specified herein. Owner/Engineer approval of required factory tests is required prior to shipment of the equipment.
6. Field Tests:
a. Submittals shall be made for field tests as specified herein
7. Operation and Maintenance Manuals:
a. O&M manual submittals shall be made in accordance with the requirements of section 01 78 23 and as specified herein.
b. Operation and maintenance manuals shall include the following information:
1) Manufacturer's contact address and telephone number for parts and service
2) Instruction books and/or leaflets
3) Recommended renewal parts list
4) Record Documents for the information required by the Submittals paragraph above

D. Operation and Maintenance Manuals:
1. Operation and maintenance manuals shall include the following information:
a. Manufacturer's contact address and telephone number for parts and service
b. Instruction books and/or leaflets
c. Recommended renewal parts list
d. Record Documents for the information required by the Submittals paragraph above

1.04 REFERENCE CODES AND STANDARDS:

A. Instrumentation equipment, materials and installation shall comply with the National Electrical Code (NEC and with the latest edition of the following codes and standards:
1. National Electrical Safety Code (NESC)
2. Occupational Safety and Health Administration (OSHA)
3. NEMA ICS 1-101 Diagrams, Designations and Symbols

4. ANSI/ISA-5.06.01-2007 - Functional Requirements Documentation for Control Software Applications
5. ISA-TR20.00.01-2001 - Specification Forms for Process Measurement and Control Instruments Part 1: General Considerations Updated with 27 New Specification Forms in 2004-2005
6. ISA-5.4-1991 Instrument Loop Diagrams
7. ISA-5.5-1985 Graphic Symbols for Process Displays
8. ISA-5.1-1984 (R1992) Instrumentation Symbols and Identification
9. ISA-5.3-1983 Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic, and Computer Systems
10. ISA-20-1981 Specification Forms for Process Measurement and Control Instruments, Primary Elements, and Control Valves
11. ISA-5.2-1976 (R1992) Binary Logic Diagrams for Process Operations
12. NEMA ICS 6 Enclosures for Industrial Controls and Systems
13. National Fire Protection Association (NFPA)
14. National Electrical Manufacturers Association (NEMA)
15. American National Standards Institute (ANSI)
16. Insulated Cable Engineers Association (ICEA)
17. International Society of Automation (ISA)
18. Underwriters Laboratories (UL)
19. UL 508, the Standard of Safety for Industrial Control Equipment
20. UL 508A, the Standard of Safety for Industrial Control Panels
21. UL 50, the Standard of Safety for Enclosures for Electrical Equipment
22. NFPA 79, Electrical Standard for Industrial Machinery
23. Factory Mutual (FM)
24. NFPA 70 National Electrical Code (NEC)
25. NFPA 70E Standard for Electrical Safety in the Workplace
26. ANSI C37.90.2 Standard Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers
27. NEMA ICS 4 Terminal Blocks for Industrial Use
28. NEMA LS1 Low Voltage Surge Protection Devices
29. UL 1283 Standard for Safety-Electromagnetic Interference Filters
30. UL 1449 Third Edition Surge Protective Devices
31. City of San Antonio, Texas Electrical Code
32. All equipment and installations shall conform to applicable Federal, State, and local codes

1.05 QUALITY ASSURANCE:

A. The manufacturer of this equipment shall have produced similar equipment for a minimum period of five (5) years. When requested by the Owner/Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

B. The control panels shall be assembled in a UL-certified panel shop, experienced in the assembled of control panels for wastewater and water treatment systems. A submittal of the documentation, that certifies the panel fabrication shop is a UL-certified shop, is required.

C. Equipment components and devices shall be UL labeled wherever UL standards exist for such equipment. The completed control panel shall be UL Labeled in accordance with UL 508 and 508A and other applicable UL standards. The panel shall also be UL labeled for the environment in which it is to be placed. A UL label shall be affixed to the inside of the external door by the panel fabrication assembly. Submit a facsimile of the UL label in the submittal information.

D. Equipment submitted shall fit within the space shown on the Drawings. Equipment which does not fit within the space is not acceptable.

1.06 DELIVERY STORAGE AND HANDLING:

A. Equipment shall be handled and stored in accordance with manufacturer's instructions. Two (2) copies of these instructions shall be included with the equipment at time of shipment, and shall be made available to the Contractor and Owner/Engineer.

B. Shipping groups shall be designed to be shipped by truck, rail, or ship. Accessories shall be packaged and shipped separately.

C. Within (5) five days after shipment of all equipment, Manufacturer shall ship all software, supplied under this Section of the Specifications, by Registered Mail or Approved Courier, to the Owner’s Representative, with a copy of the Shipment Manifest

D. Visibly damaged panels shall be returned to the Manufacturer’s UL 508 facility, for examination and damaged equipment replaced at no expense to the Owner.

E. Equipment shall be installed in its permanent finished location shown on the Drawings within seven (7) calendar days of arriving onsite. If the equipment cannot be installed within seven (7) calendar days, the equipment shall not be delivered to the site, but stored offsite, at the Contractor’s expense, until such time that the site is ready for permanent installation of the equipment.

F. Where space heaters are provided in equipment, provide temporary electrical power and operate space heaters during storage, and after equipment is installed in permanent location, until equipment is placed in service.

1.07 WARRANTY:

A. At a minimum, the manufacturer and contractor shall provide warranty certificates valid for one (1) year from date of project final acceptance.

B. Within such period of warranty, the Manufacturer shall promptly furnish all material and labor necessary to return the equipment to new operating condition. Any warranty work requiring shipping or transporting of the equipment shall be performed by the Manufacturer, at no expense to the Owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS:

A. Subject to compliance with the Contract Documents, the following enclosure Manufacturers are acceptable:
   1. Hoffman Enclosures
   2. Rittal Enclosures

B. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety.

2.02 RATINGS

A. Enclosure Ratings for Area Classifications:
   1. Unless otherwise specified herein or shown on the Drawings, enclosures and associated installations shall have the following ratings:
   2. Provide NEMA 4X 304 Stainless Steel enclosures for outdoor, wet locations.

B. The complete control panel assembly shall be UL certified or carry a UL listing for "Industrial Control Panels".

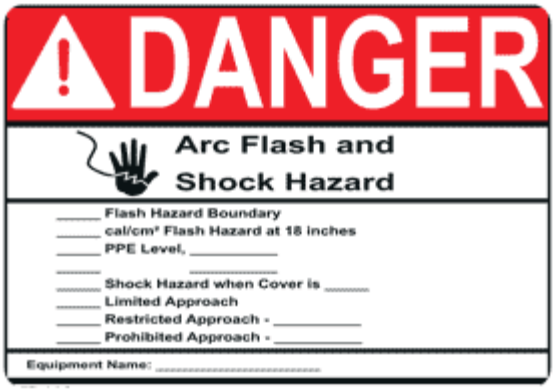
C. The control panel shall meet all applicable requirements of the National Electrical Code.

D. For additional ratings and construction notes, refer to the Drawings.

E. The service voltage shall be as specified and as shown on the Drawings. The overall short circuit withstand and interrupting rating of the equipment and devices shall be equal to or greater than the overall short circuit withstand and interrupting rating of the feeder device immediately upstream of the Control Panel, but not less than 10,000 amperes at 120 volts single phase.

F. The Manufacturer shall produce and install on each panel, an Arc Flash Warning Label listing the information, calculated from NFPA 70E (2021 Edition), Annexes, as listed below:
   1. Arc Flash Boundary
   2. (Available Incident Energy and the Corresponding Working Distance) Or (Arc Flash PPE Category for the equipment)
   3. Site Specific Level of PPE
   4. Minimum Arc Rating of Clothing
   5. Nominal System Voltage

G. Provide an Arc Flash Warning Label, printed in color and affixed to the front of each panel provided.
   1. Shown below is a typical label. Size of each label shall be not less than 8 inches wide and 6 inches tall.



2.03 CONSTRUCTION:

A. General:

1. Refer to the Drawings for: schematics, actual layout and location of equipment and components; current ratings of devices, bus bars, components; protective relays, voltage ratings of devices, components and assemblies; and other required details.

B. Enclosures:
   1. Free Standing:
      a. Enclosures shall be of factory gray painted steel, rear and side panels, with lifting eyes, without knockouts or holes. Enclosures shall have fully sized rear and side panels. Panels shall have factory cutouts where required for environmental ducts. Enclosures shall not be less than 12-gauge metal. All enclosures shall have continuous hinged, foam-in-place gasketed doors with handle latch, 3-point. All enclosures shall have bonding provisions on door.
      b. Control cabinet shall be NEMA 4X, FRP per section 260500-2.09-A.
   2. Each enclosure less than 4 ft. wide shall be shall have one overhead interior LED Light, with door switch, powered from battery backup circuit. Each enclosure greater than 4 ft. wide shall have one overhead LED light for every 4 ft. of length, or every fraction thereof.
   3. Each enclosure shall have receptacles as indicated on the plans. Receptacles shall be white color duplex 110V 20A GFCI.
   4. Each enclosure shall have, factory installed, full sized removable back and side panels, on which control components shall be mounted. Back panel shall be secured to the enclosure with collar studs for wall mounted enclosures, and 304 SS hardware for free standing enclosures.
   5. The enclosure outer door shall have a rear mounted pocket in the lower portion, which shall contain laminated copies of the panel schematics and wiring as well as a convenience receptacle mounted to the exterior door face.
   6. Electrical tables shall be laminated and adhered to the inside of the door.
   7. All enclosures shall be pad lockable.
   8. All operating control devices, indicators, and instruments shall be securely mounted on the swing panel door. All controls and indicators shall be 30mm, clearly labeled to indicate function and shall be NEMA 12 rated (NEMA 4X for outdoor panels or panels in corrosive areas). Auxiliary contacts shall be provided for remote run indication and indication of each status and alarm condition. Additional controls shall be provided as specified herein and as required by the detailed mechanical and electrical equipment requirements.
      a. All indicating lamps shall be LED push-to-test type. Equipment shall have Run indicating lamps. Lens color shall be red for RUN and amber for FAIL or ALARM. For all control applications, indicator lamps shall incorporate a push-to-test feature.
      b. Mode selector switches (HAND-OFF-AUTO, etc.) shall be as shown on the Drawings. Units shall have the number of positions and contact arrangements, as required. Each switch shall have an extra dry contact for remote monitoring as shown on the contract drawings.
      c. Push-buttons shall be momentary or maintained contacts as required by the Drawings. Contact arrangement shall be as required.
      d. All electrical enclosures shall have black phenolic labels with white 3/8” block lettering, attach with aluminum rivets.

C. Environmental Controls:
   1. Enclosure Condensate Heaters:
      a. A self-contained enclosure condensation heater with thermostat and fan shall be mounted inside the control panel.
         1) Enclosure heaters shall be energized from 120-volt, single-phase power supply and sized to prevent condensation within the enclosure.

2) Locate enclosure heaters to avoid overheating electronic hardware or producing large temperature fluctuations on the hardware.
3) Enclosure heaters shall have an internal fan for heat distribution and shall be controlled with adjustable thermostats. The thermostat shall have an adjustment range of 40 degrees Fahrenheit to 90 degrees Fahrenheit. Provide a circuit breaker or fused disconnect switch within the enclosure.
4) Enclosure heaters shall be Hoffman type DAH.

b. Strip heaters may be provided if they are 240 volt rated, powered at 120 volts AC and do not have a surface temperature higher than 60°C. Strip heaters and thermostats shall be as manufactured by Chromalox.
1) Strip heaters shall be Chromalox, Type OT, 1.5-in wide, 240 Volts, single phase, 150 watts, energized at 120 volts, with rust resisting iron sheath, Catalog No. OT-715, Product Code No. 129314. Provide sufficient wattage in heaters to prevent condensation should the interior temperature of the enclosure drop below the dew point.
2) A control thermostat mounted inside the control Panel shall be Chromalox, Type WR, single stage, Catalog No. WR-80, Product Code No.263177.
3) The strip heater terminals shall be guarded by a protective terminal cover.
4) High temperature connecting lead wire shall be used between the thermostat and the heater terminals. Wire shall be No. 12 AWG stranded nickel-plated copper with Teflon glass insulation and shall be the product of Chromalox, Catalog No. 6-CFI-12, and Product Code No. 263783.

2.04 PANEL EQUIPMENT:

A. Equipment Requirements:
1. The requirements for equipment, controls, meters, converters, etc., for the SCADA Panel, shall be as shown on the Drawings, panel schematics, and the functions specified in the Loop Descriptions.
2. The PLC shall be as specified in Section 406343 Programmable Logic Controller System.
3. All other equipment, controls, meters, converters that are designed as a part of the control panel, shall be as specified in Section 407800 Panel Mounted Equipment, Related Work Sections specified herein, as shown on the Drawings, panel schematics, and the functions specified in the Loop Descriptions.
4. Provide a main circuit protective device, DIN rail mounted, to protect the panel equipment.

2.05 EQUIPMENT INSTALLATION:

A. Equipment Mounting:
1. The location of the installed equipment shall be as shown on the Panel Layouts on the Drawings.
2. Each piece of equipment shall be securely mounted to the backplate or side plate in accordance with the manufacturer's installation instructions. All mounting hardware shall be from the front of the backplate or side plate with threaded screws. Attaching hardware shall not be installed from the rear of the backplate or side plate. Removal of any piece of equipment shall not require the removal or loosening of any other piece of equipment.
3. Operator interface equipment installed on the door shall be arranged as shown on the Drawings in accordance with the manufacturer's installation instructions. No penetrations of the door shall be made except for equipment mounting. Provide adequate clearance between pieces of equipment and door latching mechanisms.

B. Nameplates:

1. All enclosures shall have black phenolic labels with white 3/8" block lettering, attached with aluminum rivets or stainless steel screws.
2. Prior to installing the nameplates, the metal surface shall be thoroughly cleaned with 70% alcohol until all residues has been removed. Epoxy adhesive or foam tape is not acceptable.

C. Wiring Trough and Terminal Block Installation:
1. Space between wiring troughs and equipment shall be such that space for terminal blocks is provided for termination of each conductor or group of conductors before connection to the equipment. Removal of equipment for service shall not leave any exposed conductors hanging unconnected.
2. Install the wiring troughs such that one may be removed without interference from the other. Troughs shall be installed such that trough covers may be removed without cover interference.
3. Install terminal blocks on DIN rail with adequate space for access to the terminal with clear view of the wire identification label. All incoming or outgoing wiring shall enter or leave the panel on terminal blocks. Terminal blocks or wiring troughs shall not be installed on the doors. Provide terminal blocks on side plates/backplate for all door mounted equipment.
4. In no case shall internal and external wiring share a wiring trough.
5. Provide 600 volt rated terminal blocks for any conductor carrying any voltage over 120 volts to ground.
6. Provide 600 volt rated strap screw terminal blocks for any power conductors carrying over 20 amps, at any voltage. Terminals shall be double sided and supplied with removable covers to prevent accidental contact with live circuits.
7. Power conductors carrying over 20 amps, at any voltage shall be terminated to strap-screw type terminal blocks with crimp type, pre-insulated, ring-tongue lugs. Lugs shall be of the appropriate size for the terminal block screws and for the number and size of the wires terminated. Do not terminate more than one conductor in any lug, and do not land more than two conductors under any strap-screw terminal point.
8. Terminals shall have permanent, legible identification, clearly visible with the protective cover removed. Each terminal block shall have 20 percent spare terminals, but not less than two spare terminals.
9. Do not land more than two conductors per terminal point. Use the manufacturer's provided bridge connectors to interconnect terminal blocks terminating common or ground conductors.
10. Twisted shielded pair or triad cables shall have each individual conductor and shield drain wire landed on individual terminal blocks. Use the manufacturer's provided bridge connectors to interconnect terminal blocks terminating the shield drain wire conductors.
11. Provide an AC ground bar bonded to the panel enclosure, if metal, with 20 percent spare terminals.
12. Provided ground terminal blocks for each twisted-shielded pair drain wire.

D. Internal Panel Wiring:
1. Power and control wiring shall be flexible 41-strand tinned-copper, minimum size No. 14 AWG, with 600-volt, 90 degree C, flame retardant, Type SIS thermoplastic insulation. Line side power wiring shall be sized for the full fault current rating or frame size of the connected device, and as shown on the Drawings.
2. Analog signal wires shall be 600 Volt Class, insulated stranded tinned copper, twisted shielded #20 AWG pair.
3. All interconnecting wires between panel mounted equipment and external equipment shall be terminated at numbered terminal blocks. Field wiring shall not be terminated directly on any panel-mounted device.

4. All wiring shall be tagged and coded with an identification number as shown on the Drawings. Coding shall be typed on a heat shrinkable tube applied to each end showing origination and destination of each wire. Wiring shall be labeled using yellow heat-shrink-type markers with black machine-printing. The marking shall be permanent, non-smearing, solvent-resistant type from Raychem or Panduit.
5. All wiring shall be enclosed in PVC wire trough with slotted side openings and removable cover. Plan wire routing such that no low twisted shielded pair cable conducting analog 4-20 mA signals or low voltage analog signals are routed in the same wire trough as conductors carrying discrete signals or power.
6. All control panel wiring shall use the following color code:
   a. Black: AC power at line voltage
   b. Red: switched AC power
   c. Orange: May be energized while the main disconnect is in the off position
   d. White: AC neutral
   e. Orange/white stripe or white/orange stripe: separate derived neutral
   f. Red/white stripe or white/red stripe: switched neutral
   g. Green or green w/ yellow tracer: ground/earth ground
   h. Blue: Ungrounded DC power
   i. Blue/white stripe or white/blue stripe: DC grounded common
   j. Purple: 480V AC 3 phase - phase A
   k. Brown: 480V AC 3 phase - phase B
   l. Yellow: 480V AC 3 Phase - phase C

E. Field Entrance Internal Wiring:
1. Field entrance internal wiring shall be neatly grouped by circuit and bound by plastic tie wraps. Circuit groups shall be supported so that circuit terminations are not stressed. In addition, low signal wiring (millivolt and milliamp) shall be bundle separately from the rest of the control wiring.
2. All field wiring shall be tagged and coded with an identification number. Wiring shall be labeled using yellow heat-shrink-type markers with black machine-printing. Coding shall be typed on a heat shrinkable tube applied to each end of the wire. The marking shall be permanent, non-smearing, solvent-resistant type from Raychem or Panduit.
3. All conduit entering or leaving equipment shall be coordinated, in advance with the panel installer, so that the conduit entrances to the enclosure are directly below the termination area for immediate termination. Conduits shall not enter the top or side of the panel unless approved in writing by the Owner/Engineer.

F. PLC / RTU Inputs and Outputs:
1. All PLC and RTU Analog inputs and outputs shall be individually fused for each channel. All Discrete inputs and outputs shall be buffered with relays from the field connections. Discrete points shall be fused for each circuit group with no less than one fuse per card.

2.06 FACTORY TESTING:

A. The entire control panel shall be completely assembled, wired, and adjusted at the factory and shall be given the manufacturer's routine shop tests and any other additional operational test to insure the workability and reliable operation of the equipment.

B. Factory test equipment and test methods shall conform to the latest applicable requirements of ANSI, IEEE, UL, and NEMA standards.

C. The operational test shall include the proper connection of supply and control voltage and, as far as practical, a mockup of simulated control signals and control devices shall be fed into the boards to check for proper operation.

D. Factory test equipment and test methods shall conform to the latest applicable requirements of ANSI, IEEE, UL, and NEMA standards, and shall be subject to the Owner/Engineer's approval.

PART 3 EXECUTION

3.01 INSTALLER'S QUALIFICATIONS:

A. Installer shall be specialized in installing this type of equipment with minimum 5 years documented experience. Experience documentation shall be submitted for approval prior to beginning work on this project.

3.02 EXAMINATION:

A. Examine installation area to assure there is enough clearance to install the equipment. Housekeeping pads shall be included for the floor mounted panels as detailed on the Drawings.

B. Check concrete pads and base plates for uniformity and level surface.

C. Verify that the equipment is ready to install.

D. Verify field measurements are as instructed by manufacturer.

3.03 INSTALLATION:

A. The Contractor shall install all equipment per the manufacturer's recommendations and Contract Drawings.

B. Conduit hubs for use on raceway system pull and junction boxes shall be watertight, threaded aluminum, insulated throat, stainless steel grounding screw, as manufactured by T&B H150GRA Series.

C. Conduits entering a control Panel or box containing electrical equipment shall not enter the enclosure through the top. Do not penetrate the top two-thirds of any enclosure.

D. Install required safety labels.

3.04 RACEWAY SEALING:

A. 3M 2123 Re-enterable resin is required to be installed in all seal-off fittings where required in corrosive areas.

3.05 FIELD QUALITY CONTROL:

A. Inspect installed equipment for anchoring, alignment, grounding and physical damage.

B. Check tightness of all accessible electrical connections. Minimum acceptable values are specified in manufacturer's instructions.

3.06 FIELD ADJUSTING:

A. Adjust all circuit breakers, switches, access doors, operating handles for free mechanical and electrical operation as described in manufacturer's instructions.

3.07 FIELD TESTING:

A. Perform all electrical field tests recommended by the manufacturer. Disconnect all connections to solid-state equipment prior to testing.

B. Test all control logic before energizing the equipment.

3.08 CLEANING:

A. Remove all rubbish and debris from inside and around the panel. Remove dirt, dust, or concrete spatter from the interior and exterior of the equipment using brushes, vacuum cleaner, or clean, lint free rags. Do not use compressed air. Also, remove any rust, grease, pencil, sharpie marks, and temporary labels.

3.09 EQUIPMENT PROTECTION AND RESTORATION:

A. Touch-up and restore damaged surfaces to factory finish, as approved by the manufacturer. If the damaged surface cannot be returned to factory specification, the surface shall be replaced.

3.10 MANUFACTURER'S CERTIFICATION:

A. A qualified factory-trained manufacturer's representative shall certify in writing that the equipment has been installed, adjusted, including all settings designated in the Power System Study, and tested in accordance with the manufacturer's recommendations.

B. The Contractor shall provide three (3) copies of the manufacturer's representative's certification.

3.11 TRAINING:

A. Provide manufacturer's services for training of plant personnel in operation and maintenance of the equipment provided under this Section.

B. The training for each type of equipment shall be for a period of not less than one (1) eight-hour day.

C. The cost of training program to be conducted with Owner's personnel shall be included in the Contract Price. The training and instruction, insofar as practicable, shall be directly related to the system being supplied.

D. Provide detailed O&M manuals to supplement the training course. The manuals shall include specific details of equipment supplied and operations specific to the project.

E. The training session shall be conducted by a manufacturer's qualified representative. Training program shall include instructions on the assembly, motor starters, protective devices, metering, and other major components.

F. The Owner reserves the right to videotape the training sessions for the Owner's use.

G. Include training manuals, handouts, and sign in sheet in control system equipment panels O&M manual.

H. Training shall be conducted after successful completion of demonstration testing of the entire project.

I. Contractor shall provide training for all devices, instruments, equipment, and systems.

J. Training shall not occur on the same day as testing.

K. Contractor shall coordinate schedule with GBRA at least two (2) weeks in advance.

END OF SECTION

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SECTION 40 70 00
INSTRUMENTATION FOR PROCESS SYSTEMS

PART 1 GENERAL

1.01 SCOPE

A. The CONTRACTOR shall furnish, install and test all field instruments, process control devices and appurtenances, as shown on the project plans, specified in the Related Sections and Divisions as specified herein.

B. Field instruments specified in other Divisions shall be manufactured in accordance with this Section and submitted as part of the equipment specified in the other Divisions.

C. The CONTRACTOR shall furnish to the ENGINEER certified calibration/recalibration (for existing Instruments) reports for field instruments and devices specified herein immediately upon completion of calibration:
   1. Receipt of any calibration/recalibration certificate shall in no way imply acceptance of any work or instrument.
   2. Each calibration/recalibration certificate shall be signed and dated by an authorized representative of the CONTRACTOR. Three copies of each completed certificate shall be submitted to the ENGINEER.
   3. Required calibration data are listed in Part 3 Testing.

1.02 RELATED SECTIONS:

A. Division 26 - Electrical

B. Process Equipment Divisions

C. Mechanical Equipment Divisions

D. Section 40 63 43 Programmable Logic Controller (PLC)

E. Section 40 67 00 Control System Equipment Panels

1.03 SUBMITTALS:

A. Submit catalog data for all items supplied from this specification Section as applicable. Submittal shall include catalog data, functions, ratings, inputs, outputs, displays, etc. sufficient to confirm that the equipment provides every specified requirement. Any options or exceptions shall be clearly indicated.

B. Submittals for equipment specified herein, for other Sections or Divisions, shall be made as a part of equipment submittals furnished under other Sections or Divisions.

C. Installation experience documentation shall be submitted for approval with the Section Equipment Submittal.

D. Operations and Maintenance Manuals:
   1. Operations and Maintenance manuals shall be constructed in accordance with Division 1 and shall include the following information:
      a. Manufacturer’s contact address and telephone number for parts and service.
      b. Instruction books and/or leaflets
      c. Recommended renewal parts list
      d. Record documents for the information required by the Submittals section above.

1.04 REFERENCE CODES AND STANDARDS:

A. The equipment in this specification shall be designed and manufactured according to latest revision of the following standards (unless otherwise noted):
   1. All meters, relays and associated equipment shall comply with the requirements of the National Electric Code and Underwriters Laboratories (UL) where applicable.
   2. Each specified device shall also conform to the standards and codes listed in the individual device paragraphs.

1.05 QUALITY ASSURANCE:

A. The manufacturer of this equipment shall have produced similar instrumentation equipment for a minimum period of five (5) years. When requested by the OWNER/ENGINEER, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

B. The equipment as submitted shall be located as shown on the project plans and shall fit within this location. Equipment with does not fit in the space as shown on the project plans is not acceptable.

C. For the equipment specified herein, the manufacturer shall be ISO 9001 2000 certified.

1.06 WARRANTY:

A. At a minimum, the manufacturer and contractor shall provide warranty certificates valid for one (1) year from date of project final acceptance.

B. Within such period of warranty, the Manufacturer shall promptly furnish all material and labor necessary to return the equipment to new operating condition. Any warranty work requiring shipping or transporting of the equipment shall be performed by the CONTRACTOR at no expense to the OWNER.

PART 2 PRODUCTS

2.01 GENERAL:

A. Hardware:
   1. All hardware used for instrument mounting shall be 304 Stainless Steel.

B. Instrument Stand (if needed):
   1. 2” Schedule 80 Double Dipped Galvanized steel pipe.

2.02 PRESSURE TRANSMITTER:

A. Electronic Gage Pressure Transmitter:
   1. Local and remote indication.
   2. Provide with Ray self-cleaning pressure snubbers.
   3. Input isolated with silicone filled stainless steel diaphragms.
   4. Local indication LCD meter scaled in PSI and mounted integral to the transmitter. Transmitter operation ranges should operate at bottom 25% of full-scale range of transmitter.
   5. Outdoor application:
      a. NEMA 4 housing
      b. View port for local indication
      c. Stainless steel flanges
      d. 2-inch pipe mount
   6. Stainless Steel certification tag for Factory Mutual (FM) Explosion Proof rating.

B. Ratings:
   1. Overpressure Limit without damage: 1500 psi
   2. Input Range: 150 psi
   3. Accuracy: +/- 0.075% of span
   4. Analog Output: 4 – 20 Ma
   5. Power Supply: 24 Vdc
   6. Operating Temperature Limits: -4° to 175°F

C. Manufacturer: Rosemount, Model: 2088, Model Number 2088G2S22A1B4DWM4S1.

2.03 ELECTROMAGNETIC FLOWMETER

A. Refer to GBRA Design Guidelines Standard Specification Section 13442 Flanged Magnetic Flow Meters.

B. Flowmeter must be equipped with one (1) 4-20 mA analog output and one (1) Modbus RS-485 output.

C. Flowmeter power shall be 24 VDC for 24 VDC UPS connection.

PART 3 EXECUTION

3.01 INSTALLER'S QUALIFICATIONS:

A. Installer shall be specialized in installing this type of equipment with minimum 5 years documented experience.

3.02 EXAMINATION:

A. Examine installation area to assure there is sufficient clearance to install the equipment.

B. Verify that the equipment is ready to install.

C. Verify field measurements are as instructed by the manufacturer.

3.03 INSTALLATION:

A. PRESSURE TRANSMITTERS AND PRESSURE SWITCHES:
   1. Shall be installed with heat trace freeze protection around the fluid housing of the instrument and all piping, valves, and fittings.
   2. Installation of the process line:
      a. A ½" bore through the process line shall be done along the upper half of the radius of that line.
      b. A ½" NPT weld a-let shall be installed over the bore
      c. A ½" NPT block (root) valve shall be installed after the weld a-let for the isolation of the process from the pressure device.
      d. A ½" NPT to ¼" NPT bushing will be installed on the isolation valve to bush down to allow for the installation of ¼" static or process lines from the process to the pressure measuring device.
      e. A 4" expansion loop shall be made after a 1' straight run off the root valve.
      f. A ¼" tubing isolation valve shall be installed and a calibration port shall be installed at the device for bleeding off pressure and calibrations can be performed.

3.04 HEAT TRACE SYSTEM:

A. Reference Section, 26 94 00, INSTRUMENTATION HEAT TRACE SYSTEM.

3.05 CONDUIT AND IDENTIFICATION:

A. When the use of flexible conduit is required a maximum of 18" shall be allowed.

B. All Instrumentation runs shall be the full length of the conduit no splices will be allowed.

C. The following nomenclature shall be used for identification:
   1. tag # (0-10) for instrumentation info: tags, devices type and termination point
   2. jb# (0-10) for junction box, power panel lighting panel and termination point
   3. r# (0-10) for rack location and termination point
   4. s# (0-10) for slot location and termination point
   5. p# (0-10) for point location and termination point

D. All instruments shall have round shaped black phenolic tags with instrument ID in white ¼" block lettering. Attach with 304 SS cable.

3.06 RACEWAY SEALING:

A. Where raceways enter terminal boxes, junction boxes, or instrumentation equipment, all entrances shall be sealed with 3M 2123 re-enterable resin. 3M 2123 re-enterable resin is required to be installed in all seal-off fittings where required in corrosive areas.

3.07 FIELD QUALITY CONTROL:

A. Inspect installed equipment for anchoring, alignment, grounding and physical damage.

B. Check tightness of all accessible electrical connections. Minimum acceptable values shall be specified in the manufacturer's instructions.

3.08 FIELD ADJUSTING:

A. Adjust all equipment for proper range and field conditions, as described in the manufacturer's instructions.

B. Any field adjustments, required for proper system operation, shall be included in the Final O&M Manuals.

3.09 TESTING:

A. Perform all electrical field tests recommended by the manufacturer.

B. Full testing (loop check) shall be done on all instrumentation and all SCADA I/O points and will be witnessed by the OWNER.

C. A calibration sheet shall be supplied for all the instruments and at the time of any instrument test.
   1. Analog device calibration sheet shall include the following:
      a. Time of calibration
      b. Date of calibration
      c. Name of the person performing the calibration
      d. Name of the witness, OWNER
      e. Test equipment used and their calibration dates
      f. Device identification S/N, device name and tag number
      g. As found voltage reading
      h. As left voltage reading
      i. As found milliamp reading @ 0%, 25%, 50%, 75% and 100%
      j. As left milliamp reading @ 0%, 25%, 50%, 75% and 100%
      k. Calibration ranges
      l. I/O points

2. I/O point data sheet for each I/O analog and discrete through SCADA:
    a. Field point location
    b. Analog or Discrete
    c. Software point location
    d. Point function
    e. Time of verification
    f. Date of verification
    g. Name of the person verifying the point
    h. Name of the witness, OWNER

3.10 CLEANING:

A. Remove all rubbish and debris from inside and around the equipment. Remove dirt, dust, or concrete spatter from the interior and exterior of the equipment using brushes, vacuum cleaner, or clean, lint free rags. Do not use compressed air. Also, remove rust grease, pencil, and sharpie marks and temporary labels.

3.11 EQUIPMENT PROTECTION AND RESTORATION:

A. Touch up and restore damaged surfaces to factory finish, as approved by the manufacturer. If the damaged surface cannot be returned to factory specification, the surface shall be replaced.

3.12 MANUFACTURER'S CERTIFICATION:

A. A qualified factory-trained and certified representative shall certify in writing that the equipment has been installed, adjusted, including all settings as defined in the Contract Documents.

3.13 TRAINING:

A. Provide the representatives, services for training of OWNER's personnel in operation and maintenance of the equipment furnished under this Section.

B. The training for each type of equipment shall be for a period of not less than one (1) eight-hour day.

C. The cost of training program to be conducted with OWNER's personnel shall be included in the Contract Price. The training and instruction, insofar as practicable, shall be directly related to the system being supplied.

D. Provide detailed O&M Manuals to supplement the training course. The manuals shall include specific details of equipment supplied and operations specific to the project.

E. The training session shall be conducted by a manufacturer's qualified representative. Training program shall include instructions on the assembly, motor starters, protective devices, metering, and other major components.

F. The OWNER reserves the right to videotape the training sessions for the OWNER's use.

G. Include training manuals, handouts, and sign-in sheet in control system equipment panels O&M manual.

H. Training shall be conducted after successful completion of demonstration testing of the entire project.

I. Contractor shall provide training for all devices, instruments, equipment, and systems.

J. Training shall not occur on the same day as testing

K. Contractor shall coordinate schedule with GBRA at least two (2) weeks in advance.

END OF SECTION

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SECTION 40 78 00
PANEL MOUNTED EQUIPMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section of the Specifications describes the requirements for panel mounted equipment to be furnished under other Sections of the Specifications as listed in the Related Work paragraph of this Section.

B. All equipment described herein shall be submitted and furnished as an integral part of equipment specified elsewhere in these Specifications.

C. Provide all flow rate displays configured to also display corresponding totalized flow.

1.02 RELATED WORK:

A. Section 407000 Instrumentation for Process Systems

B. Section 406700 Control System Equipment Panels

C. Section 406343 Programmable Logic Controller (PLC)

1.03 SUBMITTALS:

A. Submittals for equipment specified herein shall be made as a part of equipment furnished under other Sections. Individual submittals for equipment specified herein will not be accepted and will be returned un-reviewed.

B. Submit catalog data for all items supplied from this specification Section as applicable. Submittal shall include catalog data, functions, ratings, inputs, outputs, displays, etc., sufficient to confirm that the equipment provides every specified requirement. Any options or exceptions shall be clearly indicated.

C. Operation and Maintenance Manuals:
   1. O&M manual submittals shall be made in accordance with the requirements of section 01 78 23 and as specified herein.
   2. Operation and Maintenance manuals shall include the following information:
      a. Manufacturer's contact address and telephone number for parts and service.
      b. Instruction books and/or leaflets
      c. Recommended renewal parts list
      d. Record Documents for the information required by the Submittals above.

1.04 REFERENCE CODES AND STANDARDS:

A. The equipment in this specification shall be designed and manufactured according to latest revision of the following standards (unless otherwise noted):
   1. NEMA/ISCI 109 Transient Over voltage Withstand Test
   2. IEEE Std. 472/ANSI C37.90.2 Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers.
   3. IEC 255.4 Surge Withstand Capability Tests.
   4. NEMA/ICS 1 General Standard for Industrial Control Systems.
   5. NEMA/ICS 4 Terminal Blocks for Industrial Use.
   6. NEMA/ICS 6 Enclosures for Industrial Control Systems.
   7. NEMA LS 1 Low Voltage Surge Protective Devices.

8. UL 1449 Third Edition – Surge Protective Devices

B. All equipment shall comply with the requirements of the National Electric Code and Underwriters Laboratories (UL) where applicable.

C. Each specified device shall also conform to the standards and codes listed in the individual device paragraphs.

1.05 QUALITY ASSURANCE:

A. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the OWNER/ENGINEER, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

B. Equipment submitted shall fit within the space or location shown on the Drawings. Equipment which does not fit within the space or location is not acceptable.

C. For the equipment specified herein, the manufacturer shall be ISO 9001 2000 certified.

1.06 WARRANTY:

A. The Manufacturer shall warrant the equipment to be free from defects in material and workmanship for a minimum of one (1) year from date of project final acceptance. Within such period of warranty, the Manufacturer shall promptly furnish all material and labor necessary to return the equipment to new operating condition. Any warranty work requiring shipping or transporting of the equipment shall be performed by the CONTRACTOR at no expense to the OWNER.

PART 2 PRODUCTS

2.01 WIRE TROUGHS:

A. Subject to compliance with the Contract Documents, the following Manufacturers are acceptable:
1. Panduit
2. Taylor

B. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety.

2.02 DIN RAILS:

A. Subject to compliance with the Contract Documents, the following Manufacturers are acceptable:
1. Phoenix Contact
2. Entrelec
3. Weidmuller
4. Allen Bradley

B. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety.

2.03 SIGNAL ISOLATORS, BOOSTERS, CONVERTERS:

A. Subject to compliance with the Contract Documents, the following Manufacturers are acceptable:
   1. Phoenix Contact
   2. Acromag Inc.
   3. Moore Industries
   4. Lantronix

B. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety.
   1. Type:
      a. Externally powered solid state electronic type. Loop powered devices are not acceptable.
   2. Functional/Performance:
      a. Accuracy - 0.15 percent.
      b. Inputs - Current, voltage, frequency, temperature, or resistance as required.
      c. Outputs - Current or voltage as required.
      d. Isolation - There shall be complete isolation between input circuitry, output circuitry, and the power supply.
      e. Adjustments - Zero and span adjustment shall be provided.
      f. Protection - Provide RFI protection.
      g. 24 Volt DC power input.
   3. Physical:
      a. Mounting - Suitable for DIN Rail mounting in an enclosure or instrument rack. Options/Accessories Required:
         1) Mounting rack or general-purpose enclosure as required.

2.04 RELAYS AND TIMERS:

A. Subject to compliance with the Contract Documents, the following Manufacturers are acceptable:
   1. Square D
   2. IDEC
   3. Potter-Broomfield
   4. Allen-Bradley

B. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety.

C. Type:
   1. Relays shall be type of shown in the project plans. The relay shall be equipped with an indicating light to indicate when its coil is energized.
   2. Units shall be of the general-purpose plug-in type.

D. Functional/Performance:
   1. Coil voltage shall match supply voltage.
   2. Contact arrangement/function shall be as required to meet the specified control function.
   3. Mechanical life expectancy shall be in excess of 10,000,000 cycles.
   4. Duty cycle shall be rated for continuous operation.
   5. Units shall be provided with integral indicating light to indicate if relay is energized.

6. Solid state time delays shall be provided with polarity protection (DC units) and transient protection.
7. Time delay units shall be adjustable and available in ranges from .1 second to 4.5 hours.
8. Plug-in general-purpose relay.
9. Blade connector type.
10. Contact material: silver cadmium oxide.
11. Relay sockets are DIN rail mounted.
12. Internal neon or LED indicator is lit when coil is energized.
13. Clear polycarbonate dust cover with clip fastener.
14. Operating temperature: -20 to +150 °F.
15. UL listed or recognized.

E. Ratings:
1. For 120VAC service provide contacts rated 10 amps at 120VAC, for 24VDC service provide contacts rated 5 amps at 28VDC, for electronic (milliamp/ millivolt) switching applicator provide gold plated contacts rated for electronic service.
2. Relays shall be provided with dust and moisture resistant covers.

F. Physical:
1. DIN Rail mounting base
2. Screw Terminals

G. Options/Accessories Required:
1. Provide mounting sockets with pressure type terminal blocks rated 300 volt and 10 amps.
2. Provide mounting rails/holders as required.

2.05 ANALOG SIGNAL SURGE PROTECTORS (SPDS):

A. Subject to compliance with the Contract Documents, the following Manufacturers are acceptable:
1. AGM Electronics
2. Acromag Inc.
3. Moore Industries

B. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety.

2.06 DIGITAL INDICATORS:

A. Digital indicators shall be NEWPORT Electronics Model 202A-P, ma process receiver, or Precision Digital Model PD 765-6RO.

2.07 POWER SUPPLIES:

A. Subject to compliance with the Contract Documents, the following Manufacturers are acceptable:
1. IDEC
2. PULS Silverline
3. Phoenix Contact
4. Sola

B. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety.

C. Design and fabrication:

1. Converts 120 VAC input to DC power at required voltage.
2. Sized as required by the load. Minimum 2.4 A output.
3. AC input: 120 VAC +10 percent -13 percent; 47 to 63 HZ.
4. Provision for output fail alarm contact.
5. All Power Supplies shall be redundant pairs.

2.08 NAMEPLATES:

A. All enclosures shall have black phenolic labels with white 3/8" block lettering, attached with aluminum rivets or stainless steel screws.

B. Prior to installing the nameplates, the metal surface shall be thoroughly cleaned with 70% alcohol until all residues has been removed. Epoxy adhesive or foam tape is not acceptable.

PART 3 EXECUTION

3.01 INSTALLATION:

A. All equipment specified herein shall be factory installed, field adjusted, tested and cleaned as an integral part of equipment specified elsewhere in these Specifications.

END OF SECTION