

Brazos River Authority, Texas



Project Manual

Lake Granbury De Cordova Bend Dam Low Flow Outlet Works Repair Project

RFB NO. 21-05-1219

July 2021

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Brazos River Authority



Request for Bids

July 9, 2021

RFB No. 21-05-1219

Dear Prospective Respondent:

Sealed Bids will be received by the Purchasing Agent or other designee of the Brazos River Authority (BRA) no later than **10:00 AM, August 30, 2021** for **De Cordova Bend Dam Low Flow Outlet Works Repair Project**. All qualified firms including Small, Minority, Women Owned Businesses and Historically Underutilized Businesses are encouraged to submit bids in response to this request.

Bids must be submitted and received no later than the due date and time specified. Any Bid received later than the specified time, shall not be considered. The BRA is **NOT** responsible for ensuring the delivery of Bids.

Refer to Section 17. Delivery of Bid Submittals for instructions on submitting a response to this solicitation.

Bid must be clearly identified as follows on the outside of the sealed physical submission or the electronic submission subject line. The BRA shall not be responsible for submissions that are not properly identified. Proper identification of Respondent's bid is the sole responsibility of the Respondent and failure to do so may result in the submission not being included in the bid opening:

RFB TITLE: De Cordova Bend Dam Low Flow Outlet Works Repair Project

RFB NO: 21-05-1219

RFB DUE DATE: 10:00 AM, August 30, 2021

The BRA shall have the right to accept or reject any or all Bids, or any part thereof, and to waive any technicalities in the interest of the BRA.

BRA will evaluate all relevant COVID-19, health, safety and business factors on all solicitations to determine when to initiate a notice to proceed on all projects, delivery of goods and/or services or procurement of construction related services to best attempt to balance BRA needs and to protect the health and safety of BRA employees, the employees of respondents and the public at large.

Sincerely,

Anastasia V. Vance

Anastasia V. Vance, CTCD
Purchasing Agent

4600 Cobbs Drive • Waco, Texas 76710
254 761 3123

SUPPLIER DIVERSITY PURCHASING POLICY

The Brazos River Authority (BRA) will ensure that purchases of equipment, materials, supplies, and/or services conform with Texas Procurement law as applicable to the BRA, are cost effective, and contribute to the competitiveness of the BRA and its customers.

Procurement activities will be conducted in an open and fair manner with equal opportunity provided to all qualified parties. The BRA will provide equal contracting opportunities as provided by all applicable State and Federal laws to small business enterprises, Historically Underutilized Businesses and Disadvantaged Business enterprises.

GENERAL INSTRUCTIONS TO RESPONDENTS

The Work consists of the furnishing of all labor, materials, services, equipment, and appliances required for the delivery and the supplying of products and/or services as described herein and in the contract documents.

1. BID SUBMISSION: Bids must be received no later than the Bid opening date and time specified above. All Bids received after closing time will not be considered.

A. To be considered as eligible, a Respondent shall have complied with all legal requirements to permit him to operate in the State of Texas.

B. Bids must be emailed, mailed, or hand delivered to be considered.

2. WITHDRAWAL OF BIDS: No Bid may be withdrawn for a period of ninety (90) days after Bid opening, except by 1) either mutual consent of the BRA and Respondent; or 2) previously submitted Bids may be withdrawn upon written request received from Respondent prior to time established for receipt of Bids.

3. SIGNATURE ON BIDS: To be valid, Bids must be signed by an authorized person. By such signature, Respondent agrees to strictly abide by the terms, conditions, and Scope of work embodied in this Request for Bids.

4. EXAMINATION OF BID DOCUMENTS: Before submitting a Bid, all Respondents shall examine the complete Request for Bids, including Bid Notice, Instruction to Respondent, and Scope of Services, all of which are part of the Bid Documents.

5. ADDENDA: *Unless otherwise stated in the Bid*, answers to all questions, inquiries, and request for additional information will be issued in the form of Addenda. During the Bid period, prospective Respondent may be advised by Addenda of additions, deletions from, or changes in the requirements of the Bid Documents. The BRA will not be responsible for the authenticity or correctness of oral interpretations of the Bid documents or for information obtained in any other manner than through the media of Addenda. Receipt of each Addendum shall be acknowledged by Respondent.

Any questions concerning this Bid should be emailed to **Anastasia Vance**, Purchasing Agent no later than five (5) days prior to the opening of the Bid at submissions@brazos.org. This is to allow the BRA sufficient time to respond to inquiries and provide information to all interested Respondents by Addendum. *Unless otherwise stated in the Bid*, Addenda will be posted on the BRA web site at www.brazos.org. Doing Business, Purchasing and Professional Services, Request for Bids.

Respondent is responsible for checking the BRA web site (www.brazos.org) for updates and Addenda until the time at which the submission is due. Failure to respond to all requirements, including those Addenda, shall be grounds for rejection of your Bid.

6. TAXATION: The BRA is exempt under the Texas Sales Tax and Use Tax Laws, and the Respondent shall not include such taxes in the Bid.

7. QUALIFICATION OF RESPONDENTS: The BRA reserves the right to reject any Bid if the evidence submitted by, or investigation of, such Respondent fails to satisfy the BRA that such Respondent is properly qualified to carry out the obligations of the contract and to

complete the Work contemplated herein. Conditional Bids will not be accepted.

8. CONSIDERATION OF BIDS: Unless stated otherwise in the Advertisement or Request for Bids, the properly identified Bids received on time will be opened publicly and read aloud. Respondents are invited to be present.

9. COMPLIANCE WITH SCOPE OF SERVICES AND RIGHT OF SELECTION: The Respondent shall abide by and comply with the true intent of the scope of services and not take advantage of any unintentional error or omission.

10. REPRESENTATIONS: By execution and submission of this Bid, the Respondent hereby represents and warrants to the BRA that Respondent has read and understands the Bid Documents and this Bid is made in accordance with the Bid Documents.

11. INDEMNIFICATION: The Respondent shall comply with the requirements of all applicable laws, rules, and regulations and shall exonerate, indemnify and hold harmless the BRA from any and all liability or damages resulting from failure to do so.

In addition, the Respondent agrees to keep, save and hold the BRA harmless from any and all actions, liabilities, damages, judgments, costs and expenses including reasonable attorney's fees, in case an action is filed or does in any way accrue against the BRA, its officials, officers, and employees in consequence of the awarded contract for any negligent act or omission of the Respondent in the provision of services under the awarded contract, or that may result from the carelessness or lack of skill of the Respondent or the Respondent's officers, agent, contractors, assigns or employees. In the event a judgment is recovered against the BRA for any such liability, costs or expenses, such judgment shall be conclusive against the Respondent.

It is specifically understood and agreed by the Respondent that such indemnity is indemnity by the Respondent to indemnify and protect the BRA from liability, claims, suits, losses, damages or causes of action due to the Respondent's negligence, error or omission.

12. EVALUATION FACTORS: Bids that specify an "All or None" award shall be considered as a single award. In the event of a mathematical discrepancy on the Bid Form, the BRA will only consider the price determined to be most advantageous to the BRA.

13. CRITERIA FOR AWARD: If an award is to be made, the BRA will award a contract to the Respondent that represents the "Best Value" to the BRA.

14. TERMINATION: The awarded contract may be terminated at any time by the BRA for any cause without penalty or liability. Upon receipt of such notice, the supplier shall immediately discontinue all services and actions. The BRA shall pay the Respondent promptly the accrued and unpaid amounts due for services to the date of termination, to the extent the services are approved by the BRA.

15. CHANGE OF CONTRACT PRICE: The contract price may only be changed by change order or by a written amendment.

16. PAYMENT: Unless otherwise specified, payment for services and/or product will be processed within thirty (30) days from invoice date and acceptance of work and/or product. Invoices presented for payment must be submitted in accordance with instructions contained on the purchase order including reference to purchase order number and submittal to the correct address for processing. Unit price on invoice shall be in two (2) decimal places only, i.e., \$.XX.

The BRA has set a goal to have as much paperwork submitted electronically. Respondents are asked to submit invoices electronically to the following Accounts Payable email address: accounts_payable@brazos.org. Respondents who use the electronic service should not mail the original invoice.

17. CONFIDENTIALITY OF DOCUMENTS: The BRA is subject to the Texas Public Information Act (PIA). Any information submitted to the BRA by a Respondent shall be considered non-confidential and available to the public, except as follows:

In the event a Respondent considers a specific portion of their Bid to be confidential and subject to an exception to disclosure under the PIA, such portion must be clearly identified and marked "CONFIDENTIAL". Do not mark an entire proposal confidential, as this is not in conformance with the PIA and is not acceptable. Only the specific portion or portions of the Bid that the Respondent considers to be confidential pursuant to the PIA should be marked. **IF AN ENTIRE BID IS MARKED CONFIDENTIAL, THE BRA WILL NOT TREAT ANY PORTION OF THE BID AS CONFIDENTIAL AND THE BID MAY BE REJECTED AS NON-CONFORMING.** The BRA will honor notations of confidentiality made in accordance with this paragraph and decline to release such information initially. However, final determination of whether a particular portion of a Bid may in fact be withheld pursuant to the PIA will be made by the Texas Attorney General or a court of competent jurisdiction.

In the event a public information request is received for a portion of a Bid that has been marked confidential, the BRA shall ask the affected Respondent if the information may be released. If the release is agreed to, the BRA shall release the information.

If the release is denied, the matter shall be referred to the Texas Attorney General's Office in accordance with the process set forth in the PIA. The Respondent shall be fully and solely responsible for submitting arguments and evidence within the statutory timeframes to the Texas Attorney General's Office regarding its claim of confidentiality. The BRA will **NOT** submit arguments on behalf of the Respondent.

The Texas Attorney General's office shall rule on the matter. In the event that it is determined by opinion or order of the Texas Attorney General or a court of competent jurisdiction that such information may not be withheld, then such information will be made available to the requester. If it is determined that the information may be withheld, BRA will withhold the information from the requestor.

Pricing information contained in Bids or contracts is not considered confidential under the PIA and will be disclosed without making a request to the Texas Attorney General.

**REQUEST FOR BIDS
DE CORDOVA BEND DAM LOW FLOW OUTLET WORKS REPAIR PROJECT
RFB NO. 21-05-1219**

BID SUBMITTAL SCHEDULE

Bid Notices are posted on the BRA website and prospective Respondents should check www.brazos.org> Doing Business>, Purchasing & Professional Services>, Request for Bids for potential updates to Bid requirements.

ALL TIMES NOTES ARE CENTRAL STANDARD TIME

Friday, July 9, 2021	RFB is available to download from the BRA website at http://www.brazos.org/Doing-Business/Purchasing-Professional-Services/Request-for-Bids , and click on “ <i>View this RFB</i> ”.
10:00 AM Wednesday, July 21, 2021	<p>Mandatory Virtual Pre-Bid Meeting</p> <p>Join on your computer or mobile app</p> <p>Click here to join the meeting</p> <p>Or call in (audio only)</p> <p>+1 469-206-8623,,881825727# United States, Dallas</p> <p>Phone Conference ID: 881 825 727#</p> <p>Find a local number Reset PIN</p> <p>Learn More Meeting options</p>
2:00 PM Wednesday, July 21, 2021	<p>Mandatory Virtual Pre-Bid Meeting</p> <p>Join on your computer or mobile app</p> <p>Click here to join the meeting</p> <p>Or call in (audio only)</p> <p>+1 469-206-8623,,252826273# United States, Dallas</p> <p>Phone Conference ID: 252 826 273#</p> <p>Find a local number Reset PIN</p> <p>Learn More Meeting options</p>

10:00 AM Wednesday, July 28, 2021	Non-mandatory Site Visit Lake Granbury, 4552 Mambrino Highway, Granbury, Texas 76048
4:00 PM, Monday, August 9, 2021	Last date and time to ask questions or request additional information. Email questions to submissions@brazos.org
4:00 PM, Friday, August 13, 2021	Post response to questions received as of the deadline or as soon thereafter, as an Addendum on the BRA website – www.brazos.org/ Doing Business/Purchasing and Professional Services/Request for Bids.
10:00 AM, Monday, August 30, 2021	Bids are due.
10:00 AM Tuesday, August 31, 2021	Bids will be opened and read out aloud virtually at the link below https://youtu.be/9T30SITLSoQ

REQUEST FOR BIDS
DE CORDOVA BEND DAM LOW FLOW OUTLET WORKS REPAIR PROJECT
RFB NO. 21-05-1219

1. General

Construction and remediation of low flow outlet works at De Cordova Bend Dam. De Cordova Bend Dam is an active dam site. Work restrictions and constraints include any and all dam safety and operational functions required by the OWNER and/or Texas Commission on Environmental Quality (TCEQ).

The OWNER will not lower the reservoir pool elevation to accommodate any Work. Reservoir pool and tailwater elevations are not guaranteed and are subject to hydrologic conditions, hydraulic conditions and/or dam operations. The CONTRACTOR shall not stage or operate within the stilling basin without prior written approval from the OWNER. Temporary staging on the bridge deck must be coordinated with and approved in writing by the ENGINEER in advance. The CONTRACTOR must accommodate scheduled access across the bridge deck by the OWNER. The CONTRACTOR shall immediately accommodate any emergency and/or dam safety related activities and conditions.

The inclusion of a manufacturer's name, trademark, or other proprietary identification of a product shall not limit competition, but shall establish a standard of quality, implying an "or equal" clause, unless expressly specified otherwise. BRA will evaluate all relevant COVID-19, health, safety and business factors on all solicitations to determine when to initiate a notice to proceed on all projects, delivery of goods and/or services or procurement of construction related services to best attempt to balance BRA needs and to protect the health and safety of BRA employees, the employees of respondents and the public at large.

2. Scope of Services

- A. Furnish all labor, materials, equipment, and incidentals required and install two BRA supplied stainless-steel slide gates, provide coating repairs to in-situ carbon steel gate components, and remediate hydraulic system.
- B. Drawings and Specifications do not indicate or describe all the Work required to complete the Project. Additional details required for the correct installation of selected products are to be provided by the CONTRACTOR and coordinated with the ENGINEER.
- C. The following items are OWNER supplied and will be manufactured and/or delivered to the site by Hydro Gate, Inc. (Gate Manufacturer):
 - 1. Two (2) new 84"x96" slide gates and frames, including UHMW seats/seals and fasteners.
 - 2. Two (2) new 84"x96" Type "E" full-face insulating gasket sets.
- D. Construct Work as described in the Contract Documents. The Work to be performed is described in general, non-inclusive terms and includes furnishing all labor, material, equipment, and temporary work necessary to complete the following:
 - 1. Removal of two (2) 84"x96" cast iron slide gates (Gates #5 and #6) and replacement with two (2) new 84"x96" stainless-steel slide gates supplied by the OWNER.
 - 2. Removal of the existing hydraulic power unit (HPU), control panel and breather system and replacement with a new HPU, control panel, and breather system.
 - 3. Recoat existing gate thimbles and conduits for three (3) 48"x54" slide gates (Gates #1, #2 and #3) and one (1) 24"x24" slide gate (Gate #4).
 - 4. Replace the guide/seals for one (1) 48"x54" slide gate (Gate #3).
 - 5. Gate control programming, integration, startup, testing and training.
 - 6. Replace ladder center safety rail.
 - 7. Clean and treat (passivate) stainless steel.
 - 8. Closeout activities.
- E. At all times, observe and comply with all Laws and Regulations which in any manner limit, control, or apply to the actions or operations of the CONTRACTOR, their Subcontractor(s), or their employees, agents or servants, engaged in performance of the Work.

- F. The CONTRACTOR shall perform background checks on each CONTRACTOR and subcontractor employee who will be accessing the site.
1. Background security check shall be no older than one year prior to Notice to Proceed.
 2. Acceptable background sources of information include the United States Federal Government, the Department of Public Safety from the employee's home state (the state that issued their driver's license or identification card), and for non-citizens, the native country's national law-enforcement agency.
 3. Disqualifiers for Security Checks include:
 - a. Murder Conviction.
 - b. Any Terroristic Act or Threat.
 - c. Any Registered Sex Offender.
 - d. Any Conviction of Violence that Causes Serious Bodily Injury within past 5 years.
 - e. Theft Conviction within past 10 years.
 - f. Burglary Conviction within past 10 years.
 - g. CONTRACTOR and OWNER may add additional disqualifiers.
 4. The results of each background check shall be dated and the original, certified official document from the agency performing the check kept by the employer and shall bear all appropriate seals and signatures of the agency performing the check, including the agency address and telephone number.
 5. The OWNER reserves the right to visit the employer's office, whether awarded CONTRACTOR or sub-contractor, and employer will provide on demand the certified original documents to the OWNER for review. The documents shall not be removed from the employer's office. Any employee, for whom no certified official document from the agency performing the check is furnished, shall be immediately and permanently removed from the job site.
 6. The results of background checks may be audited by the OWNER as described above at any time without advanced notice.
 7. The CONTRACTOR shall submit to the OWNER the full name (including middle name) of each CONTRACTOR and subcontractor employee who will be accessing the PROJECT site at least 72 hours before planned arrival to the PROJECT site. The OWNER may perform background checks separate from the CONTRACTOR performed background checks.
 8. Any CONTRACTOR or subcontractor employee that does not meet the security qualifications from Specification Section 01 56 80, Article 1.03.A.3 or is deemed a security threat by the OWNER shall not access the PROJECT site or shall have their access privileges revoked.
- G. Salvage: The OWNER has the right to claim as salvage, any items and materials permanently removed under the work of this Section. Should such right of salvage be exercised by the OWNER, move and neatly store removed items on the site in a location agreeable to the OWNER, in a manner approved by the ENGINEER. CONTRACTOR is responsible for maintaining the equipment in its existing condition and adequately protecting it during removal until the time it is provided to the OWNER.

3. Pre-Bid Meeting (Mandatory)

- A. Virtual pre-bid meetings will be held on Wednesday, July 21, 2021 at 10:00 AM and 2:00 PM CDT, via MicroSoft Teams At this meeting, staff will discuss an overview of the scope of work, general contract terms, and document and respond to questions from the attendees. Attendance to at least one of the pre-bid meetings is mandatory for prospective bidders.
- B. Pre-Bid MicroSoft Teams - Meeting Information:

Meeting No. 1:

Join on your computer or mobile app

[Click here to join the meeting](#)

Or call in (audio only)

[+1 469-206-8623,,881825727#](#) United States, Dallas

Phone Conference ID: 881 825 727#

[Find a local number](#) | [Reset PIN](#)

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Meeting No. 2:

Join on your computer or mobile app

[Click here to join the meeting](#)

Or call in (audio only)

[+1 469-206-8623,,252826273#](#) United States, Dallas

Phone Conference ID: 252 826 273#

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4. Site Visit (Non-mandatory)

- A. A site visit will be held on Wednesday, July 28, 2021 at 10:00 AM CDT. At this site visit, prospective bidders will be allowed to walk across the top of the dam, visit the equipment deck, and visit the staging area. Staff will document and respond to questions from the attendees during the site visit. Attendance to the site visit is non-mandatory for prospective bidders.
- B. Site Visit Information:
 - 1) BRA Lake Granbury Office
4510 Mambrino Hwy
Granbury, TX 76048

5. Bid Form and Base Bid

- A. The Bid Items scheduled on the Bid Form included with this RFB shall be used to bid the Work of the entire Project. Each Bid Item includes a major portion of the Work.
- B. A bid price, in number format (e.g., \$xx,xxx.xx) shall be entered legibly on the Bid Form for each scheduled Bid Item.
- C. The Bid shall include all supervision, labor, materials, services, tools, equipment, incidentals, overhead, profit, taxes and other costs necessary to enter into Contract and satisfactorily perform the Work, appropriately apportioned by the Bidder amongst the scheduled Bid Items.
 - 1) "Incidentals" includes Work specified or shown in the Contract Documents and Work that is otherwise inferable from the Contract Documents as necessary for the completed Project, for which the Bid Form does not provide a separate bid item, including but not limited to services or activities of an administrative or supervisory nature.

- D. The sum of the prices for all Bid Items constitutes Bidder's Base Bid and represents the cost for all Work required by the Project. By submission of a bid, each Bidder represents agreement with this provision and gives up the right to claim otherwise for an increase in Contract Sum or Time. No space is provided on the Bid Form for this total. The BRA will determine Bidder's total Base Bid and will include this Base Bid amount in its bid tabulation for Bid comparison purposes.

6. Information Required in the RFB Submittal - Tab Format

The BRA specifically requests succinct submittals tailored to the general and discipline-specific scope of services summarized above. All submittals become the property of the BRA. Each Bid submittal shall include the information requested below.

Tab A: Include the following:

- (1) Date your company was established and a brief history; number of employees; provide number and location of offices.
- (2) Provide name, title and office location of person who will be the principal contact for the BRA and the billing location if different.
- (3) Describe the types of organizations that your company typically serves and general nature of the work.
- (4) A list and description of similar services completed within the last five years under your current company name or any other company name similar in nature to this solicitation. This should include the name, the location, a brief description of Scope of Services, and a contact name and telephone number of a reference for each client. List litigation that your company has been a party to in the last five (5) years, under your current company name or any other company name. Include only litigation that involves business units in your company that are proposed for performing services under this RFB. List all such litigation involving owners and/or general contractors. To be fully responsive, provide the level of detail in the attached example, as well as a name and phone number to contact an authorized representative of your company in the event that the BRA needs to clarify your response. Failure to be fully responsive will be sufficient grounds for the BRA to disqualify your company.
- (5) Have you ever defaulted, failed to complete a contract or had a contract terminated by the other party? If so, where and why? Provide name and telephone number of the other party.
- (6) Qualifications data for Post Installed Concrete Anchors - Installer shall have at least five (5) years of experience in performing installation of drilled-in anchors.
- (7) Qualifications data for Painting applicator/Contractor - Contractor shall have a minimum of five (5) years' experience in application of specified products or comparable two-component steel coating product; SSPC QP 1 certification in good standing; a minimum three (3) years' experience in inspection and testing of coating systems; and NACE Coatings Inspector Program Level 1 Certification or higher in good standing.
- (8) Qualifications data for Slide Gates installer - Contractor shall have at least five (5) years successful installations of slide gates in the last 10 years, including at least two (2) of which that are 72" x 72" or larger.
- (9) Qualifications data for Hydraulic Power Unit manufacturer – The hydraulic power unit shall be furnished by a manufacturer with at least 15 years' experience in the design and fabrication of items of equipment of similar size, complexity and operating pressure; facility and processes are ISO Certified and in good standing; ability to service the area of installation within a 24-hour time period after notification; able to submit HPU manufacturer qualifications within 30 days after contract award. The contractor shall have at least five (5) successful installations of hydraulic power units in the last 10 years.
- (10) Qualifications data for Control Panel manufacturer - The control panels shall be the standard products of a manufacturer who has been regularly engaged in the successful production of high-quality control panels of the type specified for at least three (3) years.

- (11) Qualifications data for Electrical work – Installer shall have at least three (3) years of experience in performing electrical work similar in type and scope to the work specified.

Tab B: Include the following:

- (1) Complete and submit the attached Request for Bids – Bid Form
- (2) Complete and submit the attached List of Subcontractors Form
- (3) Complete and submit the attached Acknowledgment of Request for Bids and Receipt of Addenda
- (4) Bid Bond
- (5) Complete and submit the attached W-9 form.
- (6) Complete and submit the attached Conflicts of Interest Questionnaire [CIQ] form.
- (7) Complete and submit the Non-Collusion Affidavit form.
- (8) Complete and submit the Vendor Compliance to State Law form.
- (9) Submit information regarding your firm's experience as noted in Tab A numbers 6-9.

7. Health and Safety Requirements

Upon award of Contract, CONTRACTOR shall provide BRA the CONTRACTOR's current loss history information from all its insurance carriers before this Contract is executed. The information specific to workers' compensation insurance carriers must include a three (3) year history of both its Experience Modification Factor (EMOD) and its loss ratio.

Upon request by BRA, CONTRACTOR shall provide a copy of their corporate Health & Safety Program (HASP) prior to initiating any work activities associated with their contracted services agreement. Respondent shall identify safety specialist(s) responsible for implementation and accountability of Respondent's HASP. Respondent's safety specialists shall be responsible to ensure BRA health and safety specialists are consulted and advised of all health and safety applications prior to, during and following any work activities associated with Respondent's contracted service agreement.

At the pre-construction conference, CONTRACTOR shall submit the Site Safety and Health Plan (SSHP), required under Specification Section 01 35 29 "Health Safety and Emergency Procedures".

8. Bid Bond

Each Bid must be accompanied by Bid security deposit made payable to the BRA in an amount of 5% of the sum of Bidder's Bid Item prices. All bonds shall be issued by a surety authorized to conduct business in the State of Texas.

9. Performance, Payment and Warranty Bonds

Awarded Respondent must provide performance and payment bonds and warranty bond for this contract. All bonds shall be issued by a surety authorized to conduct business in the State of Texas.

10. RFB Inquiries

All inquiries, including clarifying questions, related to this RFB shall **only** be directed to the Purchasing Agent via e-mail to submissions@brazos.org. The Purchasing Agent will direct any inquiries to the appropriate BRA staff, a response will be issued and if warranted, an Addendum will be posted on the BRA's website at www.brazos.org. **Failure to adhere to this restriction during the advertising, evaluation, and selection phases will result in the rejection of a Respondent's Bid.**

11. Respondent's Past Performance

BRA will consider Respondent's past performance and may conduct reference checks with other entities regarding past performance. BRA may examine Respondent's performance including, but not limited to: the Comptroller of Public Accounts Statewide Procurement Divisions Vendor Performance Tracking System, notices of termination, cure notices, assessments of liquidated damages, litigation, audit reports, repeated negative performance, records of repeated non-responsiveness to performance issues, and non-renewals of contracts. Such sources of Respondent performance may include any governmental entity, whether an agency or political subdivision of the State of Texas, another state, or the Federal

government. Further, BRA may initiate such examinations of Respondent performance based upon media reports. Any such investigations shall be at the sole discretion of BRA, and any negative findings, as determined by BRA, may result in non-award to Respondent.

12. Conflict of Interest

Pursuant to Chapter 176 of the Local Government Code, any person or agent of a person who contracts or seeks to contract for the sale or purchase of property, goods, or services with a local government entity (i.e., Brazos River Authority) must disclose in the Conflicts of Interest Questionnaire Form ("CIQ") the person's affiliation or business relationship that might cause a conflict of interest with the local government entity. By law, the CIQ must be filed with the BRA Records Management Officer no later than seven (7) days after the date the person begins contract discussions or negotiations with the BRA, or submits an application or response to a Request for Bids, correspondence, or another writing related to a potential agreement with the BRA. Updated Questionnaires must be filed in conformance with Chapter 176.

A copy of the CIQ is attached. If you have any questions about compliance, please consult your own legal counsel. Compliance is the individual responsibility of each person or agent of a person who is subject to the filing requirement. An offense under Chapter 176 carries a penalty up to a Class A misdemeanor.

13. Disclosure of Interested Parties

Pursuant to Section 2252.908 of the Government Code, the selected Firm in contracts for the sale or purchase of property, goods, or services with a local government entity (i.e., BRA) anticipated to have a value of at least \$250,000/\$500,000 must submit a Disclosure of Interested Parties Form to the local government entity that discloses all persons at the Selected Firm who have a controlling interest in the selected Firm or who actively participated in facilitating the contract or negotiating the terms of the contract.

The requirements of Section 2252.908 of the Government Code are subject to change, and if you have any questions about compliance, please consult your own legal counsel.

https://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm

14. Term of Agreement

The Agreement shall commence upon the Effective Date and shall continue until the Work is completed in accordance with the terms of the Contract Documents.

Refer to Article 2 of the Agreement for the required Contract Times.

15. Contract

The BRA will evaluate bids and make awards on an "all or none" basis as provided below.

A bid submitted on an "all or none" or similar basis will be evaluated as follows: The lowest acceptable bid will be selected with respect to the total cost of all items.

The executed contract between BRA and the selected Respondent shall be a BRA standard form contract. Contract terms are not subject to modification and Respondent will be expected to execute the contract in substantially the form provided. Respondent should not base a bid on an expectation that BRA will modify its contract terms.

The BRA reserves the right to award contract(s) without any negotiations and reserves the right to not make awards. The BRA reserves the right to conduct studies and other investigations as necessary to evaluate any submittal. Submission of a bid confers no legal right upon any Respondent.

The decision of BRA, or its designee with regard to the above, shall be administratively final. BRA, in its sole discretion, may waive administrative deficiencies and/or minor technicalities in submittals received.

16. Insurance Requirements

The Respondent shall, at Respondent's sole expense, maintain insurance coverage as determined acceptable to the BRA. The Respondent must obtain the minimum insurance requirements and provide proof to the BRA prior to entering into a contract as set forth in the General and Supplementary Conditions.

17. Testing

The BRA reserves the right to inspect and test, Work or any portion thereof. The BRA in its sole discretion may disqualify Work or any portion thereof as non-conforming to the specifications if Work or any portion thereof does not meet the requirements of the specifications during testing.

18. Prevailing Minimum Wage Rate Determination

In accordance with the provisions of Texas Government Code Chapter 2258, Respondents are advised that Respondent, and any Subcontractors, must pay the general prevailing wage rates for construction for each craft or type of worker or mechanic employed. A copy of the BRA's prevailing wage rates for the locality in which the work under this RFB will be performed is attached. The penalty for any violation of these provisions shall be \$60.00 per underpaid worker per day or portion thereof.

19. Recycled and Recyclable Products

The BRA encourages the use of recycled products and products that may be recycled or reused.

20. Delivery of Bid Submittals

Bids may be submitted in one of the following manners:

Electronic Transmission. Email transmission to submissions@brazos.org. Emailed bid submissions shall be an attachment, in a Portable Document Format (PDF). Bids shall be clearly identified in the Subject Line as follows: RFB Title, RFB Number and RFB Due Date. The BRA shall not be responsible for submissions that are not properly identified. Proper identification of Respondent's bid is the sole responsibility of the Respondent and failure to do so may result in the submission not being included in the bid opening.

Drop Box Submission Prior to Bid Submission Deadline: Hand delivery of one sealed, clearly identified original signed paper copy submission may be received up to the bid submission deadline contained in the solicitation at the Brazos River Authority Georgetown Regional Office, 4407 IH 35, Suite 101 Georgetown Texas 78626, utilizing the secure drop box located at the entrance of the office building. The BRA shall not be responsible for submissions that are not properly identified. Proper identification of Respondent's bid is the sole responsibility of the Respondent and failure to do so may result in the submission not being included in the bid opening.

Mail-In Delivery: Mailed by commercial carrier, overnight or express mail, one sealed clearly identified original signed paper copy submission may be accepted by the Purchasing Agent or other designee up to the bid submission deadline contained in the solicitation at the Brazos River Authority Georgetown Regional Office, 4407 IH 35, Suite 101 Georgetown Texas 78626. The BRA shall not be responsible for submissions that are not properly identified. Proper identification of Respondent's bid is the sole responsibility of the Respondent and failure to do so may result in the submission not being included in the bid opening.



Brazos River Authority

REQUEST FOR BIDS – BID FORM
DE CORDOVA BEND DAM LOW FLOW OUTLET WORKS REPAIR PROJECT
RFB No. 21-05-1219

Base Bid Item	Description	Quantity	Bid Price
1	Mobilization	1	\$
2	Demobilization	1	\$
3	Bonds and Insurance	1	\$
4	Temporary Facilities and Control	1	\$
5	Video Monitoring	1	\$
6	Seal Stoplogs	1	\$
7	Dewatering	1	\$
8	Temperature and Humidity Monitoring	1	\$
9	Demolition/Salvage of Gates 5&6	1	\$
10	Recoating Thimbles and Frames	1	\$
11	Demolition/Salvage of Existing HPU	1	\$
12	New HPU and Control Panel Installed	1	\$
13	Reconnect Power, Network and Position Transducer Cables	1	\$
14	Installation of Owner Provided Gates	1	\$
15	Replace Gate 5 & 6 Ladder Center Safety Rail	1	\$
16	Replace Gate 3 Seal System	1	\$
17	Flush & Vent Existing Hydraulic Lines	1	\$
18	Field Operational Testing – Gates	1	\$
19	Field Operational Testing & Training SMCS	1	\$
20	Clean and Passivate Existing Stems and Guides	1	\$



Brazos River Authority

**REQUEST FOR BIDS – LIST OF SUBCONTRACTORS FORM
DE CORDOVA BEND DAM LOW FLOW OUTLET WORKS REPAIR PROJECT
RFB No. 21-05-1219**

Each Bidder shall set forth the name, business address, and contractor's license number of each subcontractor whom the Bidder proposes to have perform the work/labor/service for the construction work activities listed below. Bidder shall attach certifications, statements, approvals, or other qualification data required with the bid under Article 6 (Tab A) for the subcontractors enumerated below. If the bidder is self-performing the Work Activity, note "self-perform" under the name column. The bidder may add additional Work Activities but is not required to.

Name of Subcontractor	Texas Contractor License Number	Location of Business	Work Activity
(1)			Post Installed Concrete Anchors
(2)			Painting
(3)			Slide Gate Installer
(4)	N/A		Hydraulic Power Unit Manufacturer
(5)	N/A		Control Panel Manufacturer
(6)			Electrical
(7)			

**ACKNOWLEDGMENT OF REQUEST FOR BIDS AND
RECEIPT OF ADDENDA**

RESPONDENT MUST ACKNOWLEDGE RECEIPT OF THIS REQUEST FOR BIDS AND ADDENDA BY SIGNING BELOW AND SUBMITTING THIS ACKNOWLEDGEMENT WITH YOUR BID. FAILURE TO SIGN THIS ACKNOWLEDGEMENT WILL DISQUALIFY THE BID AS NON-RESPONSIVE. SIGNATURE SHALL BE HAND WRITTEN.

This acknowledgement shall become part of your response and the subsequent contract documents if applicable.

ACKNOWLEDGMENT OF REQUEST FOR BIDS:

Respondent hereby acknowledges that it has received and read the Request for Bids and all Addenda, and that this Bid is made in accordance with the provisions thereof. Respondent acknowledges that this Bid meets or exceeds all terms, requirements, conditions, and/or specifications set forth in the Request for Bids and Addenda, and exceptions or deviations from such terms, requirements, conditions, and/or specifications, if any, have been clearly and conspicuously identified as such in the Bid.

Does your company have 10 or more full time employees? Check one box only.

☐

YES

☐

NO

Name of Firm (Respondent)

Signature – Authorized Representative

Printed Name

Date

E-mail Address

Telephone Number

"General Decision Number: TX20210084 01/01/2021

Superseded General Decision Number: TX20200084

State: Texas

Construction Type: Heavy

Counties: Cass, Cherokee, Erath, Fannin, Franklin, Hood, Hopkins, Marion, Montague, Morris, Nacogdoches, Navarro, Palo Pinto, Panola, Rains, Red River, Somervell, Titus, Van Zandt and Wood Counties in Texas.

HEAVY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.95 for calendar year 2021 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, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.95 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 calendar year 2021. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/01/2021

SUTX2009-129 04/21/2009

Rates Fringes

CEMENT MASON/CONCRETE FINISHER...	\$ 13.00	0.00
LABORER: Common or General.....	\$ 8.61	0.00
LABORER: Pipelayer.....	\$ 9.94	0.00
OPERATOR: Backhoe/Trackhoe.....	\$ 11.75	0.00
OPERATOR: Bulldozer.....	\$ 14.25	0.00
OPERATOR: Front End Loader.....	\$ 11.52	0.00
TRUCK DRIVER.....	\$ 10.80	0.26

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 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) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical

order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which 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. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of 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. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage

determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

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

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write 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 the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write 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 by 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

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

"

Request for Taxpayer Identification Number and Certification

Give Form to the
requester. Do not
send to the IRS.

► Go to www.irs.gov/FormW9 for instructions and the latest information.

Print or type. See Specific Instructions on page 3.	1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.	
	2 Business name/disregarded entity name, if different from above	
	3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only one of the following seven boxes. <input type="checkbox"/> Individual/sole proprietor or single-member LLC <input type="checkbox"/> Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ► _____ Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is not disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner. <input type="checkbox"/> Other (see instructions) ► _____	4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3): Exempt payee code (if any) _____ Exemption from FATCA reporting code (if any) _____ <i>(Applies to accounts maintained outside the U.S.)</i>
	5 Address (number, street, and apt. or suite no.) See instructions.	Requester's name and address (optional)
	6 City, state, and ZIP code	
	7 List account number(s) here (optional)	

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

Note: If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number									
				-				-	
or									
Employer identification number									
				-					

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign Here	Signature of U.S. person ►	Date ►
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General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to www.irs.gov/FormW9.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)

- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, later.

By signing the filled-out form, you:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and
4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting*, later, for further information.

Note: If you are a U.S. person and a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien;
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States;
- An estate (other than a foreign estate); or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax under section 1446 on any foreign partners' share of effectively connected taxable income from such business. Further, in certain cases where a Form W-9 has not been received, the rules under section 1446 require a partnership to presume that a partner is a foreign person, and pay the section 1446 withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid section 1446 withholding on your share of partnership income.

In the cases below, the following person must give Form W-9 to the partnership for purposes of establishing its U.S. status and avoiding withholding on its allocable share of net income from the partnership conducting a trade or business in the United States.

- In the case of a disregarded entity with a U.S. owner, the U.S. owner of the disregarded entity and not the entity;
- In the case of a grantor trust with a U.S. grantor or other U.S. owner, generally, the U.S. grantor or other U.S. owner of the grantor trust and not the trust; and
- In the case of a U.S. trust (other than a grantor trust), the U.S. trust (other than a grantor trust) and not the beneficiaries of the trust.

Foreign person. If you are a foreign person or the U.S. branch of a foreign bank that has elected to be treated as a U.S. person, do not use Form W-9. Instead, use the appropriate Form W-8 or Form 8233 (see Pub. 515, *Withholding of Tax on Nonresident Aliens and Foreign Entities*).

Nonresident alien who becomes a resident alien. Generally, only a nonresident alien individual may use the terms of a tax treaty to reduce or eliminate U.S. tax on certain types of income. However, most tax treaties contain a provision known as a "saving clause." Exceptions specified in the saving clause may permit an exemption from tax to continue for certain types of income even after the payee has otherwise become a U.S. resident alien for tax purposes.

If you are a U.S. resident alien who is relying on an exception contained in the saving clause of a tax treaty to claim an exemption from U.S. tax on certain types of income, you must attach a statement to Form W-9 that specifies the following five items.

1. The treaty country. Generally, this must be the same treaty under which you claimed exemption from tax as a nonresident alien.
2. The treaty article addressing the income.
3. The article number (or location) in the tax treaty that contains the saving clause and its exceptions.
4. The type and amount of income that qualifies for the exemption from tax.
5. Sufficient facts to justify the exemption from tax under the terms of the treaty article.

Example. Article 20 of the U.S.-China income tax treaty allows an exemption from tax for scholarship income received by a Chinese student temporarily present in the United States. Under U.S. law, this student will become a resident alien for tax purposes if his or her stay in the United States exceeds 5 calendar years. However, paragraph 2 of the first Protocol to the U.S.-China treaty (dated April 30, 1984) allows the provisions of Article 20 to continue to apply even after the Chinese student becomes a resident alien of the United States. A Chinese student who qualifies for this exception (under paragraph 2 of the first protocol) and is relying on this exception to claim an exemption from tax on his or her scholarship or fellowship income would attach to Form W-9 a statement that includes the information described above to support that exemption.

If you are a nonresident alien or a foreign entity, give the requester the appropriate completed Form W-8 or Form 8233.

Backup Withholding

What is backup withholding? Persons making certain payments to you must under certain conditions withhold and pay to the IRS 24% of such payments. This is called "backup withholding." Payments that may be subject to backup withholding include interest, tax-exempt interest, dividends, broker and barter exchange transactions, rents, royalties, nonemployee pay, payments made in settlement of payment card and third party network transactions, and certain payments from fishing boat operators. Real estate transactions are not subject to backup withholding.

You will not be subject to backup withholding on payments you receive if you give the requester your correct TIN, make the proper certifications, and report all your taxable interest and dividends on your tax return.

Payments you receive will be subject to backup withholding if:

1. You do not furnish your TIN to the requester,
2. You do not certify your TIN when required (see the instructions for Part II for details),
3. The IRS tells the requester that you furnished an incorrect TIN,
4. The IRS tells you that you are subject to backup withholding because you did not report all your interest and dividends on your tax return (for reportable interest and dividends only), or
5. You do not certify to the requester that you are not subject to backup withholding under 4 above (for reportable interest and dividend accounts opened after 1983 only).

Certain payees and payments are exempt from backup withholding. See *Exempt payee code*, later, and the separate Instructions for the Requester of Form W-9 for more information.

Also see *Special rules for partnerships*, earlier.

What is FATCA Reporting?

The Foreign Account Tax Compliance Act (FATCA) requires a participating foreign financial institution to report all United States account holders that are specified United States persons. Certain payees are exempt from FATCA reporting. See *Exemption from FATCA reporting code*, later, and the Instructions for the Requester of Form W-9 for more information.

Updating Your Information

You must provide updated information to any person to whom you claimed to be an exempt payee if you are no longer an exempt payee and anticipate receiving reportable payments in the future from this person. For example, you may need to provide updated information if you are a C corporation that elects to be an S corporation, or if you no longer are tax exempt. In addition, you must furnish a new Form W-9 if the name or TIN changes for the account; for example, if the grantor of a grantor trust dies.

Penalties

Failure to furnish TIN. If you fail to furnish your correct TIN to a requester, you are subject to a penalty of \$50 for each such failure unless your failure is due to reasonable cause and not to willful neglect.

Civil penalty for false information with respect to withholding. If you make a false statement with no reasonable basis that results in no backup withholding, you are subject to a \$500 penalty.

Criminal penalty for falsifying information. Willfully falsifying certifications or affirmations may subject you to criminal penalties including fines and/or imprisonment.

Misuse of TINs. If the requester discloses or uses TINs in violation of federal law, the requester may be subject to civil and criminal penalties.

Specific Instructions

Line 1

You must enter one of the following on this line; **do not** leave this line blank. The name should match the name on your tax return.

If this Form W-9 is for a joint account (other than an account maintained by a foreign financial institution (FFI)), list first, and then circle, the name of the person or entity whose number you entered in Part I of Form W-9. If you are providing Form W-9 to an FFI to document a joint account, each holder of the account that is a U.S. person must provide a Form W-9.

a. **Individual.** Generally, enter the name shown on your tax return. If you have changed your last name without informing the Social Security Administration (SSA) of the name change, enter your first name, the last name as shown on your social security card, and your new last name.

Note: ITIN applicant: Enter your individual name as it was entered on your Form W-7 application, line 1a. This should also be the same as the name you entered on the Form 1040/1040A/1040EZ you filed with your application.

b. **Sole proprietor or single-member LLC.** Enter your individual name as shown on your 1040/1040A/1040EZ on line 1. You may enter your business, trade, or "doing business as" (DBA) name on line 2.

c. **Partnership, LLC that is not a single-member LLC, C corporation, or S corporation.** Enter the entity's name as shown on the entity's tax return on line 1 and any business, trade, or DBA name on line 2.

d. **Other entities.** Enter your name as shown on required U.S. federal tax documents on line 1. This name should match the name shown on the charter or other legal document creating the entity. You may enter any business, trade, or DBA name on line 2.

e. **Disregarded entity.** For U.S. federal tax purposes, an entity that is disregarded as an entity separate from its owner is treated as a "disregarded entity." See Regulations section 301.7701-2(c)(2)(iii). Enter the owner's name on line 1. The name of the entity entered on line 1 should never be a disregarded entity. The name on line 1 should be the name shown on the income tax return on which the income should be reported. For example, if a foreign LLC that is treated as a disregarded entity for U.S. federal tax purposes has a single owner that is a U.S. person, the U.S. owner's name is required to be provided on line 1. If the direct owner of the entity is also a disregarded entity, enter the first owner that is not disregarded for federal tax purposes. Enter the disregarded entity's name on line 2, "Business name/disregarded entity name." If the owner of the disregarded entity is a foreign person, the owner must complete an appropriate Form W-8 instead of a Form W-9. This is the case even if the foreign person has a U.S. TIN.

Line 2

If you have a business name, trade name, DBA name, or disregarded entity name, you may enter it on line 2.

Line 3

Check the appropriate box on line 3 for the U.S. federal tax classification of the person whose name is entered on line 1. Check only one box on line 3.

IF the entity/person on line 1 is a(n) . . .	THEN check the box for . . .
• Corporation	Corporation
• Individual • Sole proprietorship, or • Single-member limited liability company (LLC) owned by an individual and disregarded for U.S. federal tax purposes.	Individual/sole proprietor or single-member LLC
• LLC treated as a partnership for U.S. federal tax purposes, • LLC that has filed Form 8832 or 2553 to be taxed as a corporation, or • LLC that is disregarded as an entity separate from its owner but the owner is another LLC that is not disregarded for U.S. federal tax purposes.	Limited liability company and enter the appropriate tax classification. (P= Partnership; C= C corporation; or S= S corporation)
• Partnership	Partnership
• Trust/estate	Trust/estate

Line 4, Exemptions

If you are exempt from backup withholding and/or FATCA reporting, enter in the appropriate space on line 4 any code(s) that may apply to you.

Exempt payee code.

- Generally, individuals (including sole proprietors) are not exempt from backup withholding.
- Except as provided below, corporations are exempt from backup withholding for certain payments, including interest and dividends.
- Corporations are not exempt from backup withholding for payments made in settlement of payment card or third party network transactions.
- Corporations are not exempt from backup withholding with respect to attorneys' fees or gross proceeds paid to attorneys, and corporations that provide medical or health care services are not exempt with respect to payments reportable on Form 1099-MISC.

The following codes identify payees that are exempt from backup withholding. Enter the appropriate code in the space in line 4.

- 1—An organization exempt from tax under section 501(a), any IRA, or a custodial account under section 403(b)(7) if the account satisfies the requirements of section 401(f)(2)
- 2—The United States or any of its agencies or instrumentalities
- 3—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities
- 4—A foreign government or any of its political subdivisions, agencies, or instrumentalities
- 5—A corporation
- 6—A dealer in securities or commodities required to register in the United States, the District of Columbia, or a U.S. commonwealth or possession
- 7—A futures commission merchant registered with the Commodity Futures Trading Commission
- 8—A real estate investment trust
- 9—An entity registered at all times during the tax year under the Investment Company Act of 1940
- 10—A common trust fund operated by a bank under section 584(a)
- 11—A financial institution
- 12—A middleman known in the investment community as a nominee or custodian
- 13—A trust exempt from tax under section 664 or described in section 4947

The following chart shows types of payments that may be exempt from backup withholding. The chart applies to the exempt payees listed above, 1 through 13.

IF the payment is for . . .	THEN the payment is exempt for . . .
Interest and dividend payments	All exempt payees except for 7
Broker transactions	Exempt payees 1 through 4 and 6 through 11 and all C corporations. S corporations must not enter an exempt payee code because they are exempt only for sales of noncovered securities acquired prior to 2012.
Barter exchange transactions and patronage dividends	Exempt payees 1 through 4
Payments over \$600 required to be reported and direct sales over \$5,000 ¹	Generally, exempt payees 1 through 5 ²
Payments made in settlement of payment card or third party network transactions	Exempt payees 1 through 4

¹ See Form 1099-MISC, Miscellaneous Income, and its instructions.

² However, the following payments made to a corporation and reportable on Form 1099-MISC are not exempt from backup withholding: medical and health care payments, attorneys' fees, gross proceeds paid to an attorney reportable under section 6045(f), and payments for services paid by a federal executive agency.

Exemption from FATCA reporting code. The following codes identify payees that are exempt from reporting under FATCA. These codes apply to persons submitting this form for accounts maintained outside of the United States by certain foreign financial institutions. Therefore, if you are only submitting this form for an account you hold in the United States, you may leave this field blank. Consult with the person requesting this form if you are uncertain if the financial institution is subject to these requirements. A requester may indicate that a code is not required by providing you with a Form W-9 with "Not Applicable" (or any similar indication) written or printed on the line for a FATCA exemption code.

A—An organization exempt from tax under section 501(a) or any individual retirement plan as defined in section 7701(a)(37)

B—The United States or any of its agencies or instrumentalities

C—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities

D—A corporation the stock of which is regularly traded on one or more established securities markets, as described in Regulations section 1.1472-1(c)(1)(i)

E—A corporation that is a member of the same expanded affiliated group as a corporation described in Regulations section 1.1472-1(c)(1)(i)

F—A dealer in securities, commodities, or derivative financial instruments (including notional principal contracts, futures, forwards, and options) that is registered as such under the laws of the United States or any state

G—A real estate investment trust

H—A regulated investment company as defined in section 851 or an entity registered at all times during the tax year under the Investment Company Act of 1940

I—A common trust fund as defined in section 584(a)

J—A bank as defined in section 581

K—A broker

L—A trust exempt from tax under section 664 or described in section 4947(a)(1)

M—A tax exempt trust under a section 403(b) plan or section 457(g) plan

Note: You may wish to consult with the financial institution requesting this form to determine whether the FATCA code and/or exempt payee code should be completed.

Line 5

Enter your address (number, street, and apartment or suite number). This is where the requester of this Form W-9 will mail your information returns. If this address differs from the one the requester already has on file, write NEW at the top. If a new address is provided, there is still a chance the old address will be used until the payor changes your address in their records.

Line 6

Enter your city, state, and ZIP code.

Part I. Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. If you are a resident alien and you do not have and are not eligible to get an SSN, your TIN is your IRS individual taxpayer identification number (ITIN). Enter it in the social security number box. If you do not have an ITIN, see *How to get a TIN* below.

If you are a sole proprietor and you have an EIN, you may enter either your SSN or EIN.

If you are a single-member LLC that is disregarded as an entity separate from its owner, enter the owner's SSN (or EIN, if the owner has one). Do not enter the disregarded entity's EIN. If the LLC is classified as a corporation or partnership, enter the entity's EIN.

Note: See *What Name and Number To Give the Requester*, later, for further clarification of name and TIN combinations.

How to get a TIN. If you do not have a TIN, apply for one immediately. To apply for an SSN, get Form SS-5, Application for a Social Security Card, from your local SSA office or get this form online at www.SSA.gov. You may also get this form by calling 1-800-772-1213. Use Form W-7, Application for IRS Individual Taxpayer Identification Number, to apply for an ITIN, or Form SS-4, Application for Employer Identification Number, to apply for an EIN. You can apply for an EIN online by accessing the IRS website at www.irs.gov/Businesses and clicking on Employer Identification Number (EIN) under Starting a Business. Go to www.irs.gov/Forms to view, download, or print Form W-7 and/or Form SS-4. Or, you can go to www.irs.gov/OrderForms to place an order and have Form W-7 and/or SS-4 mailed to you within 10 business days.

If you are asked to complete Form W-9 but do not have a TIN, apply for a TIN and write "Applied For" in the space for the TIN, sign and date the form, and give it to the requester. For interest and dividend payments, and certain payments made with respect to readily tradable instruments, generally you will have 60 days to get a TIN and give it to the requester before you are subject to backup withholding on payments. The 60-day rule does not apply to other types of payments. You will be subject to backup withholding on all such payments until you provide your TIN to the requester.

Note: Entering "Applied For" means that you have already applied for a TIN or that you intend to apply for one soon.

Caution: A disregarded U.S. entity that has a foreign owner must use the appropriate Form W-8.

Part II. Certification

To establish to the withholding agent that you are a U.S. person, or resident alien, sign Form W-9. You may be requested to sign by the withholding agent even if item 1, 4, or 5 below indicates otherwise.

For a joint account, only the person whose TIN is shown in Part I should sign (when required). In the case of a disregarded entity, the person identified on line 1 must sign. Exempt payees, see *Exempt payee code*, earlier.

Signature requirements. Complete the certification as indicated in items 1 through 5 below.

1. Interest, dividend, and barter exchange accounts opened before 1984 and broker accounts considered active during 1983.

You must give your correct TIN, but you do not have to sign the certification.

2. Interest, dividend, broker, and barter exchange accounts opened after 1983 and broker accounts considered inactive during 1983. You must sign the certification or backup withholding will apply. If you are subject to backup withholding and you are merely providing your correct TIN to the requester, you must cross out item 2 in the certification before signing the form.

3. Real estate transactions. You must sign the certification. You may cross out item 2 of the certification.

4. Other payments. You must give your correct TIN, but you do not have to sign the certification unless you have been notified that you have previously given an incorrect TIN. "Other payments" include payments made in the course of the requester's trade or business for rents, royalties, goods (other than bills for merchandise), medical and health care services (including payments to corporations), payments to a nonemployee for services, payments made in settlement of payment card and third party network transactions, payments to certain fishing boat crew members and fishermen, and gross proceeds paid to attorneys (including payments to corporations).

5. Mortgage interest paid by you, acquisition or abandonment of secured property, cancellation of debt, qualified tuition program payments (under section 529), ABLE accounts (under section 529A), IRA, Coverdell ESA, Archer MSA or HSA contributions or distributions, and pension distributions. You must give your correct TIN, but you do not have to sign the certification.

What Name and Number To Give the Requester

For this type of account:	Give name and SSN of:
1. Individual	The individual
2. Two or more individuals (joint account) other than an account maintained by an FFI	The actual owner of the account or, if combined funds, the first individual on the account ¹
3. Two or more U.S. persons (joint account maintained by an FFI)	Each holder of the account
4. Custodial account of a minor (Uniform Gift to Minors Act)	The minor ²
5. a. The usual revocable savings trust (grantor is also trustee)	The grantor-trustee ¹
b. So-called trust account that is not a legal or valid trust under state law	The actual owner ¹
6. Sole proprietorship or disregarded entity owned by an individual	The owner ³
7. Grantor trust filing under Optional Form 1099 Filing Method 1 (see Regulations section 1.671-4(b)(2)(i)(A))	The grantor*
For this type of account:	Give name and EIN of:
8. Disregarded entity not owned by an individual	The owner
9. A valid trust, estate, or pension trust	Legal entity ⁴
10. Corporation or LLC electing corporate status on Form 8832 or Form 2553	The corporation
11. Association, club, religious, charitable, educational, or other tax-exempt organization	The organization
12. Partnership or multi-member LLC	The partnership
13. A broker or registered nominee	The broker or nominee

For this type of account:	Give name and EIN of:
14. Account with the Department of Agriculture in the name of a public entity (such as a state or local government, school district, or prison) that receives agricultural program payments	The public entity
15. Grantor trust filing under the Form 1041 Filing Method or the Optional Form 1099 Filing Method 2 (see Regulations section 1.671-4(b)(2)(i)(B))	The trust

¹ List first and circle the name of the person whose number you furnish. If only one person on a joint account has an SSN, that person's number must be furnished.

² Circle the minor's name and furnish the minor's SSN.

³ You must show your individual name and you may also enter your business or DBA name on the "Business name/disregarded entity" name line. You may use either your SSN or EIN (if you have one), but the IRS encourages you to use your SSN.

⁴ List first and circle the name of the trust, estate, or pension trust. (Do not furnish the TIN of the personal representative or trustee unless the legal entity itself is not designated in the account title.) Also see *Special rules for partnerships*, earlier.

***Note:** The grantor also must provide a Form W-9 to trustee of trust.

Note: If no name is circled when more than one name is listed, the number will be considered to be that of the first name listed.

Secure Your Tax Records From Identity Theft

Identity theft occurs when someone uses your personal information such as your name, SSN, or other identifying information, without your permission, to commit fraud or other crimes. An identity thief may use your SSN to get a job or may file a tax return using your SSN to receive a refund.

To reduce your risk:

- Protect your SSN,
- Ensure your employer is protecting your SSN, and
- Be careful when choosing a tax preparer.

If your tax records are affected by identity theft and you receive a notice from the IRS, respond right away to the name and phone number printed on the IRS notice or letter.

If your tax records are not currently affected by identity theft but you think you are at risk due to a lost or stolen purse or wallet, questionable credit card activity or credit report, contact the IRS Identity Theft Hotline at 1-800-908-4490 or submit Form 14039.

For more information, see Pub. 5027, Identity Theft Information for Taxpayers.

Victims of identity theft who are experiencing economic harm or a systemic problem, or are seeking help in resolving tax problems that have not been resolved through normal channels, may be eligible for Taxpayer Advocate Service (TAS) assistance. You can reach TAS by calling the TAS toll-free case intake line at 1-877-777-4778 or TTY/TDD 1-800-829-4059.

Protect yourself from suspicious emails or phishing schemes.

Phishing is the creation and use of email and websites designed to mimic legitimate business emails and websites. The most common act is sending an email to a user falsely claiming to be an established legitimate enterprise in an attempt to scam the user into surrendering private information that will be used for identity theft.

The IRS does not initiate contacts with taxpayers via emails. Also, the IRS does not request personal detailed information through email or ask taxpayers for the PIN numbers, passwords, or similar secret access information for their credit card, bank, or other financial accounts.

If you receive an unsolicited email claiming to be from the IRS, forward this message to phishing@irs.gov. You may also report misuse of the IRS name, logo, or other IRS property to the Treasury Inspector General for Tax Administration (TIGTA) at 1-800-366-4484. You can forward suspicious emails to the Federal Trade Commission at spam@uce.gov or report them at www.ftc.gov/complaint. You can contact the FTC at www.ftc.gov/idtheft or 877-IDTHEFT (877-438-4338). If you have been the victim of identity theft, see www.IdentityTheft.gov and Pub. 5027.

Visit www.irs.gov/IdentityTheft to learn more about identity theft and how to reduce your risk.

Privacy Act Notice

Section 6109 of the Internal Revenue Code requires you to provide your correct TIN to persons (including federal agencies) who are required to file information returns with the IRS to report interest, dividends, or certain other income paid to you; mortgage interest you paid; the acquisition or abandonment of secured property; the cancellation of debt; or contributions you made to an IRA, Archer MSA, or HSA. The person collecting this form uses the information on the form to file information returns with the IRS, reporting the above information. Routine uses of this information include giving it to the Department of Justice for civil and criminal litigation and to cities, states, the District of Columbia, and U.S. commonwealths and possessions for use in administering their laws. The information also may be disclosed to other countries under a treaty, to federal and state agencies to enforce civil and criminal laws, or to federal law enforcement and intelligence agencies to combat terrorism. You must provide your TIN whether or not you are required to file a tax return. Under section 3406, payers must generally withhold a percentage of taxable interest, dividend, and certain other payments to a payee who does not give a TIN to the payer. Certain penalties may also apply for providing false or fraudulent information.

CONFLICT OF INTEREST QUESTIONNAIRE
For vendor doing business with local governmental entity

FORM CIQ

This questionnaire reflects changes made to the law by H.B. 23, 84th Leg., Regular Session.

This questionnaire is being filed in accordance with Chapter 176, Local Government Code, by a vendor who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the vendor meets requirements under Section 176.006(a).

By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the vendor becomes aware of facts that require the statement to be filed. See Section 176.006(a-1), Local Government Code.

A vendor commits an offense if the vendor knowingly violates Section 176.006, Local Government Code. An offense under this section is a misdemeanor.

OFFICE USE ONLY

Date Received

1 Name of vendor who has a business relationship with local governmental entity.

2 ☐ **Check this box if you are filing an update to a previously filed questionnaire.** (The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date on which you became aware that the originally filed questionnaire was incomplete or inaccurate.)

3 Name of local government officer about whom the information is being disclosed.

Name of Officer

4 Describe each employment or other business relationship with the local government officer, or a family member of the officer, as described by Section 176.003(a)(2)(A). Also describe any family relationship with the local government officer. Complete subparts A and B for each employment or business relationship described. Attach additional pages to this Form CIQ as necessary.

A. Is the local government officer or a family member of the officer receiving or likely to receive taxable income, other than investment income, from the vendor?

☐ Yes ☐ No

B. Is the vendor receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government officer or a family member of the officer AND the taxable income is not received from the local governmental entity?

☐ Yes ☐ No

5 Describe each employment or business relationship that the vendor named in Section 1 maintains with a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership interest of one percent or more.

6 ☐ **Check this box if the vendor has given the local government officer or a family member of the officer one or more gifts as described in Section 176.003(a)(2)(B), excluding gifts described in Section 176.003(a-1).**

7

Signature of vendor doing business with the governmental entity

Date

CONFLICT OF INTEREST QUESTIONNAIRE

For vendor doing business with local governmental entity

A complete copy of Chapter 176 of the Local Government Code may be found at <http://www.statutes.legis.state.tx.us/Docs/LG/htm/LG.176.htm>. For easy reference, below are some of the sections cited on this form.

Local Government Code § 176.001(1-a): "Business relationship" means a connection between two or more parties based on commercial activity of one of the parties. The term does not include a connection based on:

- (A) a transaction that is subject to rate or fee regulation by a federal, state, or local governmental entity or an agency of a federal, state, or local governmental entity;
- (B) a transaction conducted at a price and subject to terms available to the public; or
- (C) a purchase or lease of goods or services from a person that is chartered by a state or federal agency and that is subject to regular examination by, and reporting to, that agency.

Local Government Code § 176.003(a)(2)(A) and (B):

- (a) A local government officer shall file a conflicts disclosure statement with respect to a vendor if:

- (2) the vendor:

(A) has an employment or other business relationship with the local government officer or a family member of the officer that results in the officer or family member receiving taxable income, other than investment income, that exceeds \$2,500 during the 12-month period preceding the date that the officer becomes aware that

- (i) a contract between the local governmental entity and vendor has been executed;
- or

- (ii) the local governmental entity is considering entering into a contract with the vendor;

(B) has given to the local government officer or a family member of the officer one or more gifts that have an aggregate value of more than \$100 in the 12-month period preceding the date the officer becomes aware that:

- (i) a contract between the local governmental entity and vendor has been executed; or
- (ii) the local governmental entity is considering entering into a contract with the vendor.

Local Government Code § 176.006(a) and (a-1)

- (a) A vendor shall file a completed conflict of interest questionnaire if the vendor has a business relationship with a local governmental entity and:

(1) has an employment or other business relationship with a local government officer of that local governmental entity, or a family member of the officer, described by Section 176.003(a)(2)(A);

(2) has given a local government officer of that local governmental entity, or a family member of the officer, one or more gifts with the aggregate value specified by Section 176.003(a)(2)(B), excluding any gift described by Section 176.003(a-1); or

(3) has a family relationship with a local government officer of that local governmental entity.

- (a-1) The completed conflict of interest questionnaire must be filed with the appropriate records administrator not later than the seventh business day after the later of:

- (1) the date that the vendor:

(A) begins discussions or negotiations to enter into a contract with the local governmental entity; or

(B) submits to the local governmental entity an application, response to a request for proposals or bids, correspondence, or another writing related to a potential contract with the local governmental entity; or

- (2) the date the vendor becomes aware:

(A) of an employment or other business relationship with a local government officer, or a family member of the officer, described by Subsection (a);

(B) that the vendor has given one or more gifts described by Subsection (a); or

(C) of a family relationship with a local government officer.

NON-COLLUSION AFFIDAVIT

STATE OF TEXAS §

 §

COUNTY OF _____ §

By the signature below, the signatory for the bidder certifies that neither he nor the firm, corporation, partnership or institution represented by the signatory or anyone acting for the firm bidding this project has violated the antitrust laws of this State, codified at Section 15.01, *et seq.*, Texas Business and Commerce Code, or the Federal antitrust laws, nor communicated directly or indirectly the bid made to any competitor or any other person engaged in the same line of business, nor has the signatory or anyone acting for the firm, corporation or institution submitting a bid committed any other act of collusion related to the development and submission of this bid proposal.

Signature:

Printed
Name:

Printed
Name:

Title:

Company:

Date:

SUBSCRIBED and sworn to before me the undersigned authority by _____ the _____ of, _____ on behalf of said bidder.

Notary Public in and for the
State of Texas

My commission expires: _____

VENDOR COMPLIANCE TO STATE LAW

Section 2252.002, Texas Government Code, provides that, in order to be awarded a contract as low bidder, non-resident bidders (out-of-state contractors whose corporate offices or principal place of business are outside of the State of Texas) bid projects for construction, improvements, supplies or services in Texas at an amount lower than the lowest Texas resident bidder by the same amount that a Texas resident bidder would be required to underbid a non-resident bidder in order to obtain a comparable contract in the State in which the non-resident's principal place of business is located. The appropriate blanks in Section A must be filled out by all out-of-state or non-resident bidders in order for your bid to meet specifications. The failure of out-of-state or non-resident contractors to do so will automatically disqualify that bidder. Resident bidders must check the box in Section B.

A. Non-resident vendors in _____ (give state), our principal place of business, are required to be _____ percent lower than resident bidders by state law. A copy of the statute is attached.

Non-resident vendors in _____ (give state), our principal place of business, are not required to underbid resident bidders.

B. Our principal place of business or corporate office is in the State of Texas.

☐

Please Check or mark with an "X"

BIDDER:

(please print)

By: _____ Company

(please print)

Signature: _____

(please print)

Title: _____

City / State _____ Zip _____

THIS FORM MUST BE RETURNED

EXAMPLE RESPONSE TO LITIGATION HISTORY QUESTION

<u>Date</u>	<u>Parties</u>	<u>Nature/Description of Litigation</u>	<u>Outcome</u>
2010	XYZ, Inc. v. Owner	Owner brought suit against XYZ, Inc. claiming flawed design of a concrete pad.	XYZ, Inc. Nonsuited
2011	XYZ, Inc. v. Owner	XYZ, Inc. retained to design bike path, the path collapsed in construction and owner sued XYZ, Inc. and contractor	Settled
2012	XYZ, Inc. v. Contractor	Contractor claimed XYZ, Inc. negligent on a project where Contractor was constructing a tower and the tower allegedly incorporated incorrect materials. XYZ, Inc. disputes the allegations.	Ongoing

004000A BID BOND

Surety Bond No. _____

STATE OF TEXAS

§

KNOW ALL PERSONS BY THESE

PRESENTS:

COUNTY OF _____

§

That we, _____, as Principal, and _____, as Surety, are hereby held and firmly bound unto the Brazos River Authority, McLennan County, Texas, as Oblige, in the penal sum of _____ and No/100 (\$_____.00), for the Project defined below, for payment whereof the said Principal and Surety bind themselves, their heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

Whereas the Principal has executed an agreement with Oblige, dated _____, 200_, ("Agreement") to construct the Lake Granbury De Cordova Bend Dam Low Flow Outlet Works Repair Project

NOW THEREFORE, the condition of this obligation is such that, if the Principal fails to start or complete the work, the Principal, through the Surety guarantees compensation to the bond owner to secure the performance of the terms and conditions of the Agreement, the Principal and Surety will pay unto the Oblige the penal sum of this Bond, however, if the Principal provides Performance and Payment Bonds as contemplated in the bid documents, then this obligation becomes void.

This bond is executed pursuant to Section 271.118(l) of the Texas Local Government Code and Chapter 2253, Texas Government Code as amended and all liabilities on this bond will be determined in accordance with provisions of Chapter 2253 as if it were entirely copied herein.

IN WITNESS WHEREOF, the above-named parties have executed this instrument under their several seals this _____ day of _____ in the year _____, the name and corporate seal of each corporate party being hereto affixed, and these presents duly signed by its undersigned representative pursuant to authority of its governing body.

(SEAL)

ATTEST:

By: _____

(Typed Name and Title)

Principal

By: _____

(Typed Name and Title)

(SEAL)

ATTEST:

By: _____

(Typed Name and Title)

Surety

By: _____

(Typed Name and Title)

Name and address of the Resident Agent of Surety:

Note: Bond must be issued by a solvent Surety company authorized to do business in Texas, and must meet any other requirements established by law or by oblige pursuant to applicable law. A copy of Surety agent's Power of Attorney must be attached hereto.

END of SECTION

005000 AGREEMENT

THIS AGREEMENT is dated as of the ____ day of _____ in the year 2021 by and between Brazos River Authority, hereinafter called OWNER, and **CONTRACTOR NAME**, hereinafter called CONTRACTOR.

OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

Article 1. WORK

CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents.

Article 2. CONTRACT TIMES

- 2.1 Substantial Completion: Work shall be substantially complete in accordance with paragraph 14.04 of the General Conditions as modified by the Supplementary Conditions, each of which is attached hereto and incorporated herein by reference, on or before the 450th day following the date set forth in the Notice to Proceed.
- 2.2 Final Inspection: On-site construction activities shall be fully completed as determined by the ENGINEER through the Final Inspection process in accordance with paragraph 14.06 of the General Conditions as modified by the Supplementary Conditions, each of which is attached hereto and incorporated herein by reference, on or before the 180th day after the first day of mobilization.
- 2.3 Final Completion: Work shall be completed and ready for final payment in accordance with paragraph 14.07 of the General Conditions as modified by the Supplementary Conditions, each of which is attached hereto and incorporated herein by reference, on or before the 480th day following the commencement date set forth in the Notice to Proceed or the 60th day following the date of Substantial Completion, whichever is earlier.
- 2.4. Liquidated Damages. OWNER and CONTRACTOR recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the times specified in paragraphs 2.1, 2.2 and 2.3 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions and the Supplementary Conditions. OWNER and CONTRACTOR also recognize the delays, expense and difficulties involved in proving 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), CONTRACTOR shall pay OWNER two thousand five hundred dollars (\$2,500.00) for each day that expires after the time specified in either paragraph 2.1 (Substantial Completion) or 2.2 (Final Inspection) until such milestones are achieved. After ENGINEER has issued a Certificate of Substantial Completion, CONTRACTOR shall pay OWNER two thousand five hundred dollars (\$2,500.00) for each day that expires after the time specified in paragraph 2.3 for Final Completion and readiness for Application for Final Payment until such milestone is achieved. CONTRACTOR will not be obligated to pay overlapping liquidated damages for concurrent delays.

Article 3. CONTRACT PRICE

OWNER agrees to pay CONTRACTOR in current U.S. funds the price or prices shown in the Bid Form attached hereto and incorporated herein, which is a part of this Agreement, such payments to be subject to the General Conditions and Supplementary Conditions which are attached hereto and incorporated herein. The total lump sum Contract Price is:

_____ Dollars (\$xxxxxxx.xx)

Article 4. PAYMENT PROCEDURES

CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions as modified by the Supplementary Conditions. Applications for Payment will be processed by OWNER as provided in the Standard General Conditions as modified by the Supplementary Conditions.

- 4.1. Progress Payments. Prior to Final 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 shall determine, or OWNER may withhold, in accordance with paragraph 14.02.B.5. of the General Conditions as modified by the Supplementary Conditions.
 - 4.1.1 Ninety (90) percent of Work completed (with the balance being retainage).
 - 4.1.2. Ninety (90) percent (with the balance being retainage) of the approved value of materials and equipment not incorporated in the Work but delivered, suitably stored and accompanied by documentation satisfactory to OWNER as provided in paragraph 14.02 of the General Conditions as modified by the Supplementary Conditions.
 - 4.1.3 Ten (10) percent of the price of the Work completed (retainage) will be withheld by the OWNER on this Project until Final Completion.
- 4.2 Final Payment. Upon Final Completion of the work and acceptance of CONTRACTOR's Final Application for Payment in accordance with paragraph 14.07.B. of the General Conditions as modified by the Supplementary Conditions, OWNER shall pay the remainder of the Contract Price.

Article 5. CONTRACTOR'S REPRESENTATIONS

In order to induce OWNER to enter into this Agreement, CONTRACTOR makes the following representations:

- 5.1. CONTRACTOR has thoroughly examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents including "technical data."
- 5.2. 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.
- 5.3. CONTRACTOR is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress, performance and furnishing of the Work.
- 5.4. CONTRACTOR acknowledges that OWNER does not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Contract Documents with respect to Underground Facilities at or contiguous to the Site.
- 5.5. 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 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 and procedures of construction to be employed by CONTRACTOR and all safety precautions and programs incident thereto.
- 5.6. CONTRACTOR does not consider that any additional 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 all other terms and conditions of the Contract Documents.

- 5.7. 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.
- 5.8. CONTRACTOR has given OWNER written notice of all conflicts, errors, ambiguities or discrepancies in the Contract Documents and the written resolution thereof by OWNER through issued addendum or addenda is acceptable to CONTRACTOR, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work. When said conflicts, etc., have not been resolved through interpretation or clarification by OWNER, because of insufficient time or otherwise, CONTRACTOR has included in the Bid the greater quantity or better quality of Work, or compliance with the more stringent requirement resulting in a greater cost; and said greater cost is included in the Contract Price.

Article 6. CONTRACT DOCUMENTS

The Contract Documents which comprise the entire agreement between OWNER and CONTRACTOR concerning the Work consist of the following:

- 6.1. Request for Bids
- 6.2. Agreement
- 6.3. Certificates of Insurance
- 6.4. Performance Bond
- 6.5. Payment Bond
- 6.6. Warranty Bond
- 6.7. Standard General Conditions (*of the Construction Contract.*)
- 6.8. Supplementary Conditions
- 6.9. Specifications bearing the title **DE CORDOVA BEND DAM LOW FLOW OUTLET WORKS REPAIR PROJECT, RFB No. 21-05-1519** - consisting of the Divisions and Sections listed in table of contents thereof.
- 6.10. Drawings consisting of a cover sheet and sheets numbered 2 through 20 inclusive, as listed in the Drawing Index on the Drawing cover sheet.
- 6.11. Bid Form
- 6.12. Vendor Compliance to State Law
- 6.13. Non-collusion Affidavit
- 6.14. All Addenda issued for the project.
- 6.15. Documentation submitted by CONTRACTOR prior to Notice of Award.
- 6.16. The following which may be delivered or issued after the Effective Date of the Agreement and are not attached hereto:

- 6.17. All written amendments and other documents amending, modifying or supplementing the Contract Documents pursuant to paragraph 3.04 of the General Conditions.

Article 7. MISCELLANEOUS

- 7.1. Terms used in this Agreement which are defined in the General Conditions will have the meanings indicated in the General Conditions, unless such terms are contained in or have been modified by the Supplementary Conditions, which shall then prevail. Additionally, references to provisions in the General Conditions shall be inclusive of any additions and/or modifications set forth in the Supplementary Conditions, which shall then prevail.
- 7.1.1 The term Engineer used in this Agreement shall mean the Engineer or Engineering Firm who prepared the Drawings and Specifications for the work, or such other Engineer or Engineering Firm as the OWNER may designate.
- 7.2. CONTRACTOR hereby verifies that CONTRACTOR does not boycott Israel and will not boycott Israel during the term of this Agreement.
- 7.3. 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.
- 7.4. OWNER and CONTRACTOR each bind itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect to all covenants, agreements and obligations contained in the Contract Documents.
- 7.5 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.
- 7.6 Except as otherwise provided within the Contract Documents, the failure of OWNER to enforce any provision of the Contract Documents shall not constitute or be construed as a waiver of such provision or of the right to enforce such provision. To be legally binding on OWNER, any waiver must be in writing.

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

This Agreement will be effective on _____, 2021 (which is the Effective Date of the Agreement).

OWNER: Brazos River Authority

CONTRACTOR: _____

By: DAVID COLLINSWORTH

By: _____

[CORPORATE SEAL]

Attest _____

Attest _____

Address for providing notice:

4600 Cobbs Drive
Waco, Texas 76710

Address for providing notice:

ADDRESS
ADDRESS

NOTE: If CONTRACTOR is a corporation, attach evidence of authority to sign.

END OF SECTION

006100A PERFORMANCE BOND

STATE OF TEXAS

Bond No. _____

COUNTY OF _____

C.I.P. ID No. _____

Project Name _____

Know All Men By These Presents: That _____
of the City of _____, County of _____, and
State of _____, as Principal, and _____, a
solvent company authorized under laws of the State of Texas to act as surety on bonds for
principals, are held and firmly bound unto The Brazos River Authority (OWNER), in the penal sum
of _____

U.S. Dollars (\$ _____ U.S.) for payment whereof, well and truly to be made,
said Principal and Surety bind themselves and their heirs, administrators, executors, successors
and assigns, jointly and severally, by these presents:

Conditions of this Bond are such that, whereas, Principal has entered into a certain written
contract with OWNER, dated the _____ day of _____, _____,
which Agreement 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 condition of this obligation is such, that if said Principal shall faithfully perform
said Agreement and shall in all respects duly and faithfully observe and perform all and singular
covenants, conditions and agreements in and by said contract agreed and covenanted by
Principal to be observed and performed, and according to true intent and meaning of said
Agreement hereto annexed, then this obligation shall be void; otherwise to remain in full force and
effect. If OWNER notifies Principal and Surety the OWNER is considering declaring Principal in
default, Surety agrees to meet with OWNER and Principal no later than fifteen days after receipt
of such notice to discuss methods of performing the Work of the Contract.

Provided, however, that this bond is executed pursuant to provisions of Chapter 2253, Texas
Government Code as amended and all liabilities on this bond shall be determined in accordance
with provisions of said Article to same extent as if it were copied at length herein.

Surety, for value received, stipulates and agrees that no change in Contract Time or Contract
Amount shall in anywise affect its obligation on this bond, and it does hereby waive notice of any
such change in Contract Time or Contract Amount.

In witness whereof, said Principal and Surety have signed and sealed this instrument this
_____ day of _____, _____.

Principal

Surety

By _____

By _____

Title _____

Title _____

Address _____

Address _____

Telephone _____ Fax _____

Telephone _____ Fax _____

E-Mail Address _____

E-Mail Address _____

Name and address of Resident Agent of Surety:

Note: Bond shall be issued by a solvent Surety company authorized to do business in Texas, and shall meet any other requirements established by law or by OWNER pursuant to applicable law. A copy of surety agent's "Power of Attorney" must be attached hereto.

END of SECTION

006200 PAYMENT BOND

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

CONTRACTOR:

_____,
_____,

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

_____,
_____,

OWNER (Name and Address):

Brazos River Authority
4600 Cobbs Drive
Waco, Texas 76710

CONTRACT

Date:

Amount: \$

Description: **Brazos River Authority – De Cordova Bend Dam Low Flow Outlet Works**

BOND

Date (Not earlier than Contract Date):

Amount: \$

Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Payment Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

Company: _____ (Corp. Seal)

SURETY

Company: _____ (Corp. Seal)

Signature: _____

Name and Title:

Signature: _____

Name and Title:

(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

CONTRACTOR AS PRINCIPAL

Company: _____ (Corp. Seal)

SURETY

Company: _____ (Corp. Seal)

Signature: _____

Name and Title:

Signature: _____

Name and Title:

EJCDC No. 1910-28-B (1996 Edition) Originally prepared through the joint efforts of the Surety Association of America, Engineers Joint Contract Documents Committee, the Associated General Contractors of America, the American Institute of Architects, the American Subcontractors Association, and the Associated Specialty Contractors.

1. The CONTRACTOR and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the OWNER to pay for labor, materials and equipment furnished for use in the performance of the Contract, which is incorporated herein by reference.

2. With respect to the OWNER, this obligation shall be null and void if the CONTRACTOR:

2.1. Promptly makes payment, directly or indirectly, for all sums due Claimants, and

2.2. Defends, indemnifies and holds harmless the OWNER from all claims, demands, liens or suits by any person or entity who furnished labor, materials or equipment for use in the performance of the Contract, provided the OWNER has promptly notified the CONTRACTOR and the Surety (at the addresses described in paragraph 12) of any claims, demands, liens or suits and tendered defense of such claims, demands, liens or suits to the CONTRACTOR and the Surety, and provided there is no OWNER Default.

3. With respect to Claimants, this obligation shall be null and void if the CONTRACTOR promptly makes payment, directly or indirectly, for all sums due.

4. The Surety shall have no obligation to Claimants under this Bond until:

4.1. Claimants who are employed by or have a direct contract with the CONTRACTOR have given notice to the Surety (at the addresses described in paragraph 12) and sent a copy, or notice thereof, to the OWNER, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.

4.2. Claimants who do not have a direct contract with the CONTRACTOR:

1. Have furnished written notice to the CONTRACTOR and sent a copy, or notice thereof, to the OWNER, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or performed; and

2. Have either received a rejection in whole or in part from the CONTRACTOR, or not received within 30 days of furnishing the above notice any communication from the CONTRACTOR by which the CONTRACTOR had indicated the claim will be paid directly or indirectly; and

3. Not having been paid within the above 30 days, have sent a written notice to the Surety and sent a copy, or notice thereof, to the OWNER, stating that a claim

is being made under this Bond and enclosing a copy of the previous written notice furnished to the CONTRACTOR.

5. If a notice required by paragraph 4 is given by the OWNER to the CONTRACTOR or to the Surety, that is sufficient compliance.

6. When the Claimant has satisfied the conditions of paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:

6.1. Send an answer to the Claimant, with a copy to the OWNER, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.

6.2. Pay or arrange for payment of any undisputed amounts.

7. The Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

8. Amounts owed by the OWNER to the CONTRACTOR under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any Performance Bond. By the CONTRACTOR furnishing and the OWNER accepting this Bond, they agree that all funds earned by the CONTRACTOR in the

performance of the Contract are dedicated to satisfy obligations of the CONTRACTOR and the Surety under this Bond, subject to the OWNER's priority to use the funds for the completion of the Work.

9. The Surety shall not be liable to the OWNER, Claimants or others for obligations of the CONTRACTOR that are unrelated to the Contract. The OWNER shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

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

~~11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by paragraph 4.1 or paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.~~

12. Notice to the Surety, the OWNER or the CONTRACTOR shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, the OWNER or the CONTRACTOR, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is, that this Bond shall be construed as a statutory Bond and not as a common law bond.

14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, the CONTRACTOR shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. DEFINITIONS

15.1. Claimant: An individual or entity having a direct contract with the CONTRACTOR or with a Subcontractor of the CONTRACTOR to furnish labor, materials or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of the CONTRACTOR and the CONTRACTOR'S Subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

15.2. Contract: The agreement between the OWNER and the CONTRACTOR identified on the signature page, including all Contract Documents and changes thereto.

15.3. OWNER Default: Failure of the OWNER, which has neither been remedied nor waived, to pay the CONTRACTOR as required by the Contract or to perform and complete or comply with the other terms thereof.

END OF SECTION

WARRANTY BOND

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

VENDOR:

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

BUYER:

AGREEMENT

Date:
Amount: \$
Description:

BOND

Date:
Amount (10% of the original Contract Price): \$
Modifications to this Bond Form:

Surety and VENDOR, intending to be legally bound hereby, subject to the terms printed herein, do each cause this Warranty Bond to be duly executed on its behalf by its authorized officer, agent or representative.

VENDOR AS PRINCIPAL

Company: _____(Corp. Seal)

Signature: _____
Name and Title:

SURETY

Company: _____Corp. Seal)

Signature: _____
Name and Title:
(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

VENDOR AS PRINCIPAL

Company: _____(Corp. Seal)

Signature: _____
Name and Title:

SURETY

Company: _____Corp. Seal)

Signature: _____
Name and Title:
(Attach Power of Attorney)

1. The VENDOR and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the BUYER for the performance of all warranty obligations in the Agreement, including payment of claims, subcontractors, suppliers and mechanics, as a condition of release of the Performance Bond and Payment Bond with respect to the Project by BUYER. The following terms and conditions shall apply with respect to this Bond:

1.1 The Agreement, including any Exhibits and amendments thereto, is incorporated herein by reference.

1.2 Surety's obligations under this Bond shall include the VENDOR's obligation to pay its subcontractors, suppliers and mechanics for warranty-related work or supply.

1.3 Surety's obligations under this Bond shall include without limitation the VENDOR's obligation design, fabricate, deliver, and warrant the Engineered Product.

1.4 The guarantees contained herein shall survive the final completion of the design and construction called for in the Agreement.

1.5 As a part of the obligation secured hereby and in addition to the face amount specified, costs and reasonable expenses and fees, including reasonable attorneys' fees incurred by BUYER in successfully enforcing the obligation, shall be included.

2. If the VENDOR shall promptly and faithfully perform all of its warranty obligations for the work specified in the Agreement Documents, as they may be amended or supplemented, including, without limitation, the fulfillment of all specified warranties for such work and payment of claims, subcontractors, suppliers and mechanics, then the Surety and the VENDOR have no obligation under this Bond, except to participate in conferences as provided in paragraph 3.1. Otherwise this obligation shall remain in full force and effect.

3. If there is no BUYER Default, the Surety's obligation under this Bond shall arise whenever the following actions are undertaken by the BUYER:

3.1. The BUYER notifies the VENDOR and the Surety at the addresses described in paragraph 9 below, that the BUYER is considering declaring a VENDOR Default and requests a conference with the

VENDOR and the Surety be held not later than fifteen days after receipt of such notice to discuss methods of performing the warranty obligations under the Agreement. If the BUYER, the VENDOR and the Surety agree, the VENDOR shall be allowed a reasonable time to perform the warranty work, but such an agreement shall not waive the BUYER's right, if any, subsequently to declare a VENDOR Default.

3.2. The BUYER has declared a VENDOR Default and formally terminated the VENDOR's right to complete the warranty obligations under the Agreement. Such VENDOR Default shall not be declared earlier than twenty days after the VENDOR and the Surety have received notice as provided in paragraph 3.1.

4. When the BUYER has satisfied the conditions of paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

4.1 Arrange for VENDOR to perform and complete the warranty obligations of this Agreement.

4.2 Complete the warranty work itself in accordance with the terms and conditions of the Agreement Documents then in effect, through its agents or through independent Vendors.

4.3 Obtain bids or negotiated proposals from qualified Vendors acceptable to the BUYER for a contract for performance and completion of the warranty work (as defined in the Agreement), through a procurement process approved by the BUYER, arrange for a contract to be prepared for execution by the BUYER and the Vendor selected with the BUYER's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the Bonds issued on the Agreement.

4.4 Waive its right to perform and complete, arrange for completion, or obtain a new Vendor and with reasonable promptness under the circumstances, (i) after investigation, determine the amount for which it may be liable to the BUYER and, as soon as practicable after the amount is determined, tender payment therefore to the BUYER, or (ii) deny liability in whole or in part and notify the BUYER citing reasons therefore.

5. If the Surety does not proceed as provided in paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen days after receipt of an additional written notice from

the BUYER to the Surety demanding that the Surety perform its obligations under this Bond, and the BUYER shall be entitled to enforce any remedy available to the BUYER. If the Surety proceeds as provided in paragraph 4.4, and the BUYER refuses the payment tendered or the Surety has denied liability, in whole or in part, without further notice the BUYER shall be entitled to enforce any remedy available to the BUYER.

6. After the BUYER has terminated the VENDOR's right to complete the Agreement, and if the Surety elects to act under paragraph 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the BUYER shall not be greater than those of the VENDOR under the Agreement, and the responsibilities of the BUYER to the Surety shall not be greater than those of the BUYER under the Agreement. To a limit of the amount of this Bond plus reasonable expenses and fees incurred by BUYER in successfully enforcing this obligation, the Surety is obligated without duplication for the following:

6.1. The responsibilities of the VENDOR for correction of defective materials or labor.

6.2. Actual damages including additional legal, design professional and delay costs resulting from the VENDOR's Default or resulting from the actions or failure to act of the Surety.

6.3. Liquidated damages, or if no liquidated damages are specified in the Agreement, actual damages caused by delayed performance or non-performance of the VENDOR or the actions or failure to act of Surety under Paragraph 5.

7. The Surety shall not be liable to the BUYER or others for obligations of the VENDOR that are unrelated to the Agreement. No right of action shall accrue on this Bond to any person or entity other than the BUYER or its heirs, executors, administrators, or successors.

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

9. Notice to the Surety, the BUYER or the VENDOR shall be mailed or delivered to the address shown on the signature page.

10. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the Agreement was to be performed,

any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted here from and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

11. Initially capitalized terms not otherwise defined hereinafter shall have the definitions set forth in the Exhibit A of the Agreement.

11.1. Agreement: The agreement between the BUYER and the VENDOR identified on the signature page, including all exhibits and amendments thereto.

11.2. VENDOR Default: Failure of the VENDOR, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Agreement.

11.3. BUYER Default: Failure of the BUYER, which has neither been remedied nor waived, to pay the VENDOR as required by the Agreement or to perform and complete or comply with the other terms thereof.

12. No alteration, modification or supplement to the warranty provisions of the Agreement or the nature of the work to be performed thereunder, including without limitation any extension of time for performance, shall in any way affect the obligations of Surety under this Bond.

END OF SECTION

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

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly By

[INSERT LOGOS]

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
a practice division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

AMERICAN CONSULTING ENGINEERS COUNCIL

AMERICAN SOCIETY OF CIVIL ENGINEERS

This document has been approved and endorsed by

The Associated General [seal] Contractors of America

Construction Specifications Institute

[seal]

These General Conditions have been prepared for use with the Owner-Contractor Agreements (No. 1910-8-A-1 or 1910-8-A-2) (1996 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the EJCDC User's Guide (No. 1910-50). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (No. 1910-17) (1996 Edition).

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1420 King Street, Alexandria, VA 22314

American Consulting Engineers Council
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American Society of Civil Engineers
345 East 47th Street, New York, NY 10017

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GENERAL CONDITIONS

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Contract Documents and printed with initial or all capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof.

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

2. *Agreement*--The written instrument which is evidence of the agreement between OWNER and CONTRACTOR covering the Work.

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. *Asbestos*--Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

5. *Bid*--The offer or proposal of a bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

6. *Bidding Documents*--The Bidding Requirements and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

7. *Bidding Requirements*--The Advertisement or Invitation to Bid, Instructions to Bidders, Bid security form, if any, and the Bid form with any supplements.

8. *Bonds*--Performance and payment bonds and other instruments of security.

9. *Change Order*--A document recommended by ENGINEER 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, issued on or after the Effective Date of the Agreement.

10. *Claim*--A demand or assertion by OWNER or CONTRACTOR seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*--The entire and integrated written agreement between the OWNER and CONTRACTOR concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*--The Contract Documents establish the rights and obligations of the parties and include the Agreement, Addenda (which pertain to the Contract Documents), CONTRACTOR's Bid (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Notice to Proceed, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all Written Amendments, Change Orders, Work Change Directives, Field Orders, and ENGINEER's written interpretations and clarifications issued on or after the Effective Date of the Agreement. Approved Shop Drawings and the reports and drawings of subsurface and physical conditions are not Contract Documents. Only printed or hard copies of the items listed in this paragraph are Contract Documents. Files in electronic media format of text, data, graphics, and the like that may be furnished by OWNER to CONTRACTOR are not Contract Documents.

13. *Contract Price*--The moneys payable by OWNER to CONTRACTOR for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*--The number of days or the dates stated in the Agreement to: (i) achieve Substantial Completion; and (ii) complete the Work so that it is ready for final payment as evidenced by ENGINEER's written recommendation of final payment.

15. *CONTRACTOR*--The individual or entity with whom OWNER has entered into the Agreement.

16. *Cost of the Work*--See paragraph 11.01.A for definition.

17. *Drawings*--That part of the Contract Documents prepared or approved by ENGINEER which graphically shows the scope, extent, and character of the Work to be performed by CONTRACTOR. Shop Drawings and other CONTRACTOR submittals are not Drawings as so defined.

18. *Effective Date of the Agreement*--The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

19. *ENGINEER*--The individual or entity named as such in the Agreement.

20. *ENGINEER's Consultant*--An individual or entity having a contract with ENGINEER to furnish services as ENGINEER's independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions.

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

22. *General Requirements*--Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

23. *Hazardous Environmental Condition*--The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

24. *Hazardous Waste*--The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

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

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

27. *Milestone*--A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

28. *Notice of Award*--The written notice by OWNER to the apparent successful bidder stating that upon timely compliance by the apparent successful bidder with the conditions precedent listed therein, OWNER will sign and deliver the Agreement.

29. *Notice to Proceed*--A written notice given 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 under the Contract Documents.

30. *OWNER*--The individual, entity, public body, or authority with whom CONTRACTOR has entered into the Agreement and for whom the Work is to be performed.

31. *Partial Utilization*--Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.

32. *PCBs*--Polychlorinated biphenyls.

33. *Petroleum*--Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

34. *Project*--The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part as may be indicated elsewhere in the Contract Documents.

35. *Project Manual*--The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

36. *Radioactive Material*--Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

37. *Resident Project Representative*--The authorized representative of ENGINEER who may be assigned to the Site or any part thereof.

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

39. *Shop Drawings*--All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for CONTRACTOR and submitted by CONTRACTOR to illustrate some portion of the Work.

40. *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 for access thereto, and such other lands furnished by OWNER which are designated for the use of CONTRACTOR.

41. *Specifications*--That part of the Contract Documents consisting of written technical descriptions of materials, equipment, systems, standards, and workmanship as applied to the Work and certain administrative details applicable thereto.

42. *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 at the Site.

43. *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.

44. *Supplementary Conditions*--That part of the Contract Documents which amends or supplements these General Conditions.

45. *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 any Subcontractor.

46. *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 those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

47. *Unit Price Work*--Work to be paid for on the basis of unit prices.

48. *Work*--The entire completed 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, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

49. *Work Change Directive*--A written statement to CONTRACTOR issued on or after the Effective Date of the Agreement and signed by OWNER and recommended by ENGINEER ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

50. *Written Amendment*--A written statement modifying the Contract Documents, signed by OWNER and CONTRACTOR on or after the Effective Date of the Agreement and normally dealing with the nonengineering or nontechnical rather than strictly construction-related aspects of the Contract Documents.

1.02 Terminology

A. Intent of Certain Terms or Adjectives

1. Whenever in the Contract Documents the terms "as allowed," "as approved," or terms of like effect or import are used, or 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 action or determination will be solely to evaluate, in general, the completed Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed 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 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 paragraph 9.10 or any other provision of the Contract Documents.

B. *Day*

1. The word “day” shall constitute a calendar day of 24 hours measured from midnight to the next midnight.

C. *Defective*

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it does not conform to the Contract Documents or does not meet the requirements of any inspection, reference standard, test, or approval referred to in the Contract Documents, or 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 14.04 or 14.05).

D. *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. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of CONTRACTOR, “provide” is implied.

E. Unless stated otherwise in the Contract Documents, words or phrases which 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*

A. When CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR shall also deliver to OWNER such Bonds as CONTRACTOR may be required to furnish.

2.02 *Copies of Documents*

A. OWNER shall furnish to CONTRACTOR up to ten copies of the Contract Documents. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *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 Agreement 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 Agreement. 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 Agreement, whichever date is earlier.

2.04 *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 the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

A. *CONTRACTOR’s Review of Contract Documents:* Before undertaking each part of the Work, CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. CONTRACTOR shall promptly report in writing to ENGINEER any conflict, error, ambiguity, or discrepancy which CONTRACTOR may discover and shall obtain a written interpretation or clarification from ENGINEER before proceeding with any Work affected thereby; however, 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 knew or reasonably should have known thereof.

B. *Preliminary Schedules:* Within ten days after the Effective Date of the Agreement (unless otherwise speci-

fied in the General Requirements), CONTRACTOR shall submit to ENGINEER for its 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 Documents;
2. a preliminary schedule of Shop Drawing and Sample submittals which will list each required submittal and the times for submitting, reviewing, and processing such submittal; 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.

C. *Evidence of Insurance:* Before any Work at the Site is started, CONTRACTOR and OWNER shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which CONTRACTOR and OWNER respectively are required to purchase and maintain in accordance with Article 5.

2.06 *Preconstruction Conference*

A. Within 20 days after the Contract Times start to run, but before any Work at the Site is started, a conference attended by 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 2.05.B, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

2.07 *Initial Acceptance of Schedules*

A. Unless otherwise provided in the Contract Documents, at least ten 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 2.05.B. CONTRACTOR shall have an additional ten 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 any specified Milestones and 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 Shop Drawing and Sample 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 component parts of the Work.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is called for by one is as binding as if called for 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. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to OWNER.

C. Clarifications and interpretations of the Contract Documents shall be issued by ENGINEER as provided in Article 9.

3.02 *Reference Standards*

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

1. Reference to standards, specifications, manuals, 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, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement 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 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 Contract Documents, nor shall any such provision or instruction be effective to assign to OWNER, ENGINEER, or any of ENGINEER's Consultants, agents, or employees 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 Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. If, during the performance of the Work, CONTRACTOR discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, CONTRACTOR shall report it to ENGINEER in writing at once. CONTRACTOR shall not proceed with the Work affected thereby (except in an emergency as required by paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in paragraph 3.04; provided, however, that CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any such conflict, error, ambiguity, or discrepancy unless CONTRACTOR knew or reasonably should have known thereof.

B. *Resolving Discrepancies*

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

a. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); 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 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways: (i) a Written Amendment; (ii) a Change Order; or (iii) a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways: (i) a Field Order; (ii) ENGINEER's approval of a Shop Drawing or Sample; or (iii) ENGINEER's written interpretation or clarification.

3.05 *Reuse of Documents*

A. CONTRACTOR and any Subcontractor or Supplier or other individual or entity performing or furnishing any of the Work under a direct or indirect contract with OWNER: (i) shall not 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 ENGINEER's Consultant, including electronic media editions; and (ii) shall not reuse any of 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 adaption by ENGINEER. This prohibition will survive final payment, completion, and acceptance of the Work, or termination or completion of the Contract. Nothing herein shall preclude CONTRACTOR from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 - AVAILABILITY OF LANDS;
SUBSURFACE AND PHYSICAL CONDITIONS;
REFERENCE POINTS

4.01 *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. OWNER will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If CONTRACTOR and OWNER are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in OWNER's furnishing the Site, CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

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 the Work is to be performed 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.

4.02 *Subsurface and Physical Conditions*

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

1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that ENGINEER has used in preparing the Contract Documents; and
2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that ENGINEER has used in preparing the Contract Documents.

B. *Limited Reliance by CONTRACTOR on Technical Data Authorized:* CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not

Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any Claim against OWNER, ENGINEER, or any of ENGINEER's Consultants 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.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If CONTRACTOR believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed 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 4.02 is materially inaccurate; or
2. is of such a nature as to require a change in the Contract Documents; 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 6.16.A), notify OWNER and ENGINEER in writing about such condition. CONTRACTOR shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *ENGINEER's Review:* After receipt of written notice as required by paragraph 4.03.A, ENGINEER will promptly review the pertinent condition, determine the necessity of OWNER's obtaining additional exploration or tests with respect thereto, and advise OWNER in writing (with a copy to CONTRACTOR) of ENGINEER's findings and conclusions.

C. *Possible Price and Times Adjustments*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition 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 meet any one or more of the categories described in paragraph 4.03.A; and

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 paragraphs 9.08 and 11.03.

2. CONTRACTOR shall not be entitled to any adjustment in the Contract Price or Contract Times if:

a. CONTRACTOR knew of the existence of such conditions at the time CONTRACTOR made a final commitment to OWNER in respect of Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

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

c. CONTRACTOR failed to give the written notice within the time and as required by paragraph 4.03.A.

3. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be

made therefor as provided in paragraph 10.05. However, OWNER, ENGINEER, and ENGINEER's Consultants shall not be liable to CONTRACTOR for any claims, costs, losses, or 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) sustained by CONTRACTOR on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous 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 shall not be responsible for the accuracy or completeness of any such information or data; 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 such information and data,

b. locating all Underground Facilities shown or indicated in the Contract Documents,

c. coordination of the Work with the owners of such Underground Facilities, including OWNER, during construction, and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by paragraph 6.16.A), identify the owner of such Underground Facility

and give written notice to that owner and to OWNER and ENGINEER. ENGINEER will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, CONTRACTOR shall be responsible for the safety and protection of such Underground Facility.

2. If ENGINEER concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price of Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that CONTRACTOR did not know of and could not reasonably have been expected to be aware of or to have anticipated. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, OWNER or CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

4.05 *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.

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the ENGINEER in the preparation of the Contract Documents.

B. *Limited Reliance by CONTRACTOR on Technical Data Authorized:* CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any Claim against OWNER, ENGINEER or any of ENGINEER's Consultants 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 any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. CONTRACTOR shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by CONTRACTOR, Subcontractors, Suppliers, or anyone else for whom CONTRACTOR is responsible.

D. If CONTRACTOR encounters a Hazardous Environmental Condition or if CONTRACTOR or anyone for whom CONTRACTOR is responsible creates a Hazardous Environmental Condition, CONTRACTOR shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by paragraph 6.16); and (iii) 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.

E. CONTRACTOR shall not be required to resume Work in connection with such condition or in any affected area until after OWNER has obtained any required permits related thereto and delivered to CONTRACTOR written

notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. 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, either party may make a Claim therefor as provided in paragraph 10.05.

F. 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. If OWNER and CONTRACTOR cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in paragraph 10.05. OWNER may have such deleted portion of the Work performed by OWNER's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, OWNER shall indemnify and hold harmless CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and the officers, directors, partners, employees, agents, other 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: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by CONTRACTOR or by anyone for whom CONTRACTOR is responsible. Nothing in this paragraph 4.06.E shall obligate OWNER to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, other 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 created by CONTRACTOR or by anyone for whom CONTRACTOR is responsible. Nothing in this paragraph 4.06.F shall obligate CONTRACTOR to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of paragraphs 4.02, 4.03, and 4.04 are not intended to apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 - BONDS AND INSURANCE

5.01 Performance, Payment, and Other Bonds

A. CONTRACTOR shall furnish performance and payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all CONTRACTOR's obligations under the Contract Documents. These Bonds shall remain in effect at least until one year after the date when final payment becomes due, except as provided otherwise by Laws or Regulations or by the Contract Documents. CONTRACTOR shall also furnish such other Bonds as are required by the Contract Documents.

B. All Bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All Bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.

C. If the surety on any Bond furnished by CONTRACTOR is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of paragraph 5.01.B, CONTRACTOR shall within 20 days thereafter substitute another Bond and surety, both of which shall comply with the requirements of paragraphs 5.01.B and 5.02.

5.02 Licensed Sureties and Insurers

A. All Bonds and insurance required by the Contract Documents to be purchased and maintained by OWNER or CONTRACTOR shall be obtained from surety or insurance companies that are duly licensed or authorized in the

jurisdiction in which the Project is located to issue Bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

A. CONTRACTOR shall deliver to OWNER, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by OWNER or any other additional insured) which CONTRACTOR is required to purchase and maintain. OWNER shall deliver to CONTRACTOR, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by CONTRACTOR or any other additional insured) which OWNER is required to purchase and maintain.

5.04 *CONTRACTOR's Liability Insurance*

A. CONTRACTOR shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which 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:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
2. claims for damages because of bodily injury, occupational sickness or disease, or death of CONTRACTOR's employees;
3. claims for damages because of bodily injury, sickness or disease, or death of any person other than CONTRACTOR's employees;
4. claims for damages insured by reasonably available personal injury liability coverage which are sustained: (i) by any person as a result of an offense directly or indirectly related to the employment of such person by CONTRACTOR, or (ii) by any other person for any other reason;
5. 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; and

6. 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.

B. The policies of insurance so required by this paragraph 5.04 to be purchased and maintained shall:

1. with respect to insurance required by paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insureds (subject to any customary exclusion in respect of professional liability) OWNER, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, and other 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;
2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
3. include completed operations insurance;
4. include contractual liability insurance covering CONTRACTOR's indemnity obligations under paragraphs 6.07, 6.11, and 6.20;
5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least thirty days prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the CONTRACTOR pursuant to paragraph 5.03 will so provide);
6. remain in effect at least until final payment and at all times thereafter when CONTRACTOR may be correcting, removing, or replacing defective Work in accordance with paragraph 13.07; and

7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment (and CONTRACTOR shall furnish OWNER and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to OWNER and any such additional insured of continuation of such insurance at final payment and one year thereafter).

5.05 *OWNER's Liability Insurance*

A. In addition to the insurance required to be provided by CONTRACTOR under paragraph 5.04, 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.

5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, OWNER shall purchase and maintain property insurance upon the Work at the Site in the amount of the full 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 interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an additional insured;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;

3. include expenses incurred in the repair or replacement of any insured property (including but

not limited to fees and charges of engineers and architects);

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by OWNER prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by ENGINEER;

5. allow for partial utilization of the Work by OWNER;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by OWNER, CONTRACTOR, and ENGINEER with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

B. OWNER shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary Conditions, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with paragraph 5.07.

D. OWNER shall not be responsible for purchasing and maintaining any property insurance specified in this paragraph 5.06 to protect the interests of CONTRACTOR, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by CONTRACTOR, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

E. If CONTRACTOR requests in writing that other special insurance be included in the property insurance policies provided under paragraph 5.06, OWNER shall, if possible, include such insurance, and the cost thereof will be charged to CONTRACTOR by appropriate Change Order or Written Amendment. Prior to commencement of the Work at the Site, OWNER shall in writing advise CONTRACTOR whether or not such other insurance has been procured by OWNER.

5.07 *Waiver of Rights*

A. OWNER and CONTRACTOR intend that all policies purchased in accordance with paragraph 5.06 will protect OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies 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 of the insureds or additional insureds thereunder. OWNER and CONTRACTOR waive all rights against each other and their respective officers, directors, partners, employees, agents, and other 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 Subcontractors, ENGINEER, ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other 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 as trustee or otherwise payable under any policy so issued.

B. OWNER waives all rights against CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, and other 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 peril 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 utilization pursuant to paragraph 14.05, after Substantial Completion pursuant to paragraph 14.04, or after final payment pursuant to paragraph 14.07.

C. Any insurance policy maintained by OWNER covering any loss, damage or consequential loss referred to in paragraph 5.07.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, ENGINEER, or ENGINEER's Consultants and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by paragraph 5.06 will be adjusted with OWNER and made payable to OWNER as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of paragraph 5.08.B. OWNER shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order or Written Amendment.

B. OWNER as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to OWNER's exercise of this power. If such objection be made, OWNER as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, OWNER as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, OWNER as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

A. If either OWNER or CONTRACTOR has any objection to the coverage afforded by or other provisions of

the Bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by paragraph 2.05.C. OWNER and CONTRACTOR shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the Bonds and insurance required of such party by the Contract Documents, 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. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent Bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If OWNER finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.01 *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, but CONTRACTOR shall not be responsible for the negligence of OWNER or ENGINEER in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents. CONTRACTOR shall be responsible to see that the completed Work complies accurately with the Contract Documents.

B. At all times during the progress of the Work, CONTRACTOR shall assign a competent resident superintendent thereto who shall not be replaced without written notice to OWNER and ENGINEER except under extraordinary circumstances. The superintendent will be CONTRACTOR's representative at the Site and shall have authority to act on behalf of CONTRACTOR. All communications given to or received from the superintendent shall be binding on CONTRACTOR.

6.02 *Labor; Working Hours*

A. CONTRACTOR shall provide competent, suitably qualified personnel to survey, lay out, and construct the Work 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, and CONTRACTOR will not permit overtime work or the performance of Work on Saturday, Sunday, or any legal holiday without OWNER's written consent (which will not be unreasonably withheld) given after prior written notice to ENGINEER.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the General Requirements, 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.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All warranties and guarantees specifically called for 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. 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.

6.04 *Progress Schedule*

A. CONTRACTOR shall adhere to the progress schedule established in accordance with paragraph 2.07 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 2.07) proposed adjustments in the progress schedule that will not result in changing the Contract Times (or Milestones). Such adjustments will conform generally to the progress schedule then in effect and additionally will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the progress schedule that will change the Contract Times (or Milestones) shall be submitted in accordance with the requirements of Article 12. Such adjustments may only be made by a Change Order or Written Amendment in accordance with Article 12.

6.05 *Substitutes and "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 specification or description 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 or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to ENGINEER for review under the circumstances described below.

1. *"Or-Equal" Items:* If in ENGINEER's sole discretion 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, it may be considered by ENGINEER as an "or-equal" item, in which case review and approval of the proposed item may, in ENGINEER's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this paragraph 6.05.A.1, 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: (i) it is at least equal in quality, durability, appearance, strength,

and design characteristics; (ii) it will reliably perform at least equally well the function imposed by the design concept of the completed Project as a functioning whole, and;

b. CONTRACTOR certifies that: (i) there is no increase in cost to the OWNER; and (ii) it will conform substantially, even with deviations, to the detailed requirements of the item named in the Contract Documents.

2. *Substitute Items*

a. If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR does not qualify as an "or-equal" item under paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. CONTRACTOR shall submit sufficient information as provided below to allow ENGINEER to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by ENGINEER from anyone other than CONTRACTOR.

c. The procedure for review by ENGINEER will be as set forth in paragraph 6.05.A.2.d, as supplemented in the General Requirements and as ENGINEER may decide is appropriate under the circumstances.

d. CONTRACTOR shall first 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 shall certify that the proposed substitute item will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified, and be suited to the same use as that specified. The application will state the extent, if any, to which the use of the proposed substitute item will prejudice CONTRACTOR's achievement of Substantial Completion on time, whether or not 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 work on the Project) to adapt the design to the proposed substitute item and whether or not incorporation or use of the proposed substitute item in connection with

the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute item from that specified will be identified in the application, and available engineering, sales, maintenance, repair, and replacement services will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change, all of which will be considered by ENGINEER in evaluating the proposed substitute item. ENGINEER may require CONTRACTOR to furnish additional data about the proposed substitute item.

B. Substitute Construction Methods or Procedures:

If a specific means, method, technique, sequence, or procedure of construction is shown or indicated in and expressly required by the Contract Documents, CONTRACTOR may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by ENGINEER. CONTRACTOR shall submit sufficient information to allow ENGINEER, in ENGINEER's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by ENGINEER will be similar to that provided in subparagraph 6.05.A.2.

C. Engineer's Evaluation: ENGINEER will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to paragraphs 6.05.A and 6.05.B. ENGINEER will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized until ENGINEER's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." ENGINEER will advise CONTRACTOR in writing of any negative determination.

D. Special Guarantee: OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety with respect to any substitute.

E. ENGINEER's Cost Reimbursement: ENGINEER will record time required by ENGINEER and ENGINEER's Consultants in evaluating substitute proposed or submitted by CONTRACTOR pursuant to paragraphs 6.05.A.2 and 6.05.B and in making changes in the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) occasioned thereby. Whether or not ENGINEER approves a substitute item so proposed or submitted by CON-

TRACTOR, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER's Consultants for evaluating each such proposed substitute.

F. CONTRACTOR's Expense: CONTRACTOR shall provide all data in support of any proposed substitute or "or-equal" at CONTRACTOR's expense.

6.06 Concerning Subcontractors, Suppliers, and Others

A. CONTRACTOR shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to OWNER as indicated in paragraph 6.06.B), whether initially or as a replacement, against whom OWNER may have reasonable objection. CONTRACTOR shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom CONTRACTOR has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to OWNER in advance for acceptance by OWNER by a specified date prior to the Effective Date of the Agreement, and if CONTRACTOR has submitted a list thereof in accordance with the Supplementary Conditions, OWNER's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. CONTRACTOR shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued or Written Amendment signed. 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 any right of OWNER or ENGINEER to reject defective Work.

C. 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. Nothing in the Contract Documents 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 shall it create any obligation on the part of OWNER or

ENGINEER to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

D. CONTRACTOR shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR.

E. CONTRACTOR shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with ENGINEER through CONTRACTOR.

F. 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.

G. All Work performed for CONTRACTOR by a Subcontractor or Supplier will be pursuant to an appropriate agreement between CONTRACTOR and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of OWNER and ENGINEER. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in paragraph 5.06, the agreement between the CONTRACTOR and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against OWNER, CONTRACTOR, ENGINEER, ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other 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 such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, CONTRACTOR will obtain the same.

6.07 *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. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees or agents, and other consultants 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.

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, 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 opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. CONTRACTOR shall pay all charges of utility owners for connections to the Work, and OWNER shall pay all charges of such utility owners for capital costs related thereto, such as plant investment fees.

6.09 *Laws and Regulations*

A. CONTRACTOR shall give all notices and 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 knowing or having reason to know that it is contrary to Laws or Regulations, CONTRACTOR shall bear 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; however, it shall not be CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations,

but this shall not relieve CONTRACTOR of CONTRACTOR's obligations under paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work may be the subject of an adjustment in Contract Price or Contract Times. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in paragraph 10.05.

6.10 Taxes

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

6.11 Use of Site and Other Areas

A. Limitation on Use of Site and Other Areas

1. CONTRACTOR shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. CONTRACTOR shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, CONTRACTOR shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultant, and the officers, directors, partners, employees, agents, and other consultants 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 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 by or based upon CONTRACTOR's performance of the Work.

B. *Removal of Debris During Performance of the Work:* During the progress of the Work CONTRACTOR shall keep the Site and other 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 make it ready for utilization by OWNER. At the completion of the Work CONTRACTOR shall remove from the Site 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 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 property to stresses or pressures that will endanger it.

6.12 Record Documents

A. CONTRACTOR shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to ENGINEER for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to ENGINEER for OWNER.

6.13 Safety and Protection

A. CONTRACTOR shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. 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, 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 owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property. All damage, injury, or loss to any property referred to in paragraph 6.13.A.2 or 6.13.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 (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of OWNER or ENGINEER or ENGINEER's Consultant, 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). CONTRACTOR's duties and responsibilities for safety and for protection of the Work 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 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *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.

6.15 *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.

6.16 *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.

6.17 *Shop Drawings and Samples*

A. CONTRACTOR shall submit Shop Drawings to ENGINEER for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals. All submittals will be identified as ENGINEER may require and in the number of copies specified in the General Requirements. The 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 6.17.E.

B. CONTRACTOR shall also submit Samples to ENGINEER for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals. Each Sample will be identified clearly as to material, Supplier, pertinent data such as catalog numbers, and the use for which intended and otherwise as ENGINEER may require to enable ENGINEER to review the submittal for the limited purposes required by paragraph 6.17.E. The numbers of each Sample to be submitted will be as specified in the Specifications.

C. Where a Shop Drawing or Sample is required by the Contract Documents or the schedule of Shop Drawings and Sample submittals acceptable to ENGINEER as required by paragraph 2.07, 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.

D. *Submittal Procedures*

1. Before submitting each Shop Drawing or Sample, CONTRACTOR shall have determined and verified:

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

b. all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

c. all information relative to means, methods, techniques, sequences, and procedures of construction and safety precautions and programs incident thereto; and

d. CONTRACTOR shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

2. Each submittal shall bear a stamp or specific written indication that CONTRACTOR has satisfied CONTRACTOR's obligations under the Contract Documents with respect to CONTRACTOR's review and approval of that submittal.

3. At the time of each submittal, CONTRACTOR shall give ENGINEER specific written notice of such variations, if any, that the Shop Drawing or Sample submitted may have from the requirements of the Contract Documents, such notice to be in a written communication separate from the submittal; and, in addition, shall cause a specific notation to be made on each Shop Drawing and Sample submitted to ENGINEER for review and approval of each such variation.

E. *ENGINEER's Review*

1. ENGINEER will timely review and approve Shop Drawings and Samples in accordance with the schedule of Shop Drawings and Sample 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 (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. ENGINEER's review and approval of Shop Drawings or Samples shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract Documents unless CONTRACTOR has in writing called ENGINEER's attention to each such variation at the time of each submittal as required by paragraph 6.17.D.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 approval; nor will any approval by ENGINEER relieve CONTRACTOR from responsibility for complying with the requirements of paragraph 6.17.D.1.

F. *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.

6.18 *Continuing the Work*

A. 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, except as permitted by paragraph 15.04 or as OWNER and CONTRACTOR may otherwise agree in writing.

6.19 *CONTRACTOR's General Warranty and Guarantee*

A. CONTRACTOR warrants and guarantees to OWNER, ENGINEER, and ENGINEER's Consultants that all Work will be in accordance with the Contract Documents and will not be defective. 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.

B. 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 acceptance by OWNER or any failure to do so;

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

6.20 Indemnification

A. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, and other 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:

1. 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; and

2. is caused in whole or in part 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, regardless of whether or not caused in part by any negligence or omission of an individual or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such individual or entity.

B. In any and all claims against OWNER or ENGINEER or any of their respective consultants, agents, officers, directors, partners, or employees 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 6.20.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 6.20.A shall not extend to the liability of ENGINEER and ENGINEER's Consultants or to the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them 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 7 - OTHER WORK

7.01 *Related Work at Site*

A. OWNER may perform other work related to the Project at the Site by OWNER's employees, or let other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to CONTRACTOR prior to starting any such other work; and

2. if OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in paragraph 10.05.

B. CONTRACTOR shall afford each other contractor who is a party to such a direct contract and each utility owner (and OWNER, if OWNER is performing the other work with OWNER's employees) proper and safe access to the Site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work and shall properly coordinate the Work with theirs. Unless otherwise provided in the Contract Documents, 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 their work and will only cut or alter their work with the written consent of ENGINEER and the others whose work will be affected. The duties and responsibilities of CONTRACTOR under this paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of CONTRACTOR in said direct contracts between OWNER and such utility owners and other contractors.

C. If the proper execution or results of any part of CONTRACTOR's Work depends upon work performed by others under this Article 7, 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.

7.02 *Coordination*

A. If OWNER intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

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

ARTICLE 8 - OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, OWNER shall issue all communications to CONTRACTOR through ENGINEER.

8.02 *Replacement of ENGINEER*

A. In case of termination of the employment of ENGINEER, OWNER shall appoint an engineer to whom CONTRACTOR makes no reasonable objection, whose status under the Contract Documents shall be that of the former ENGINEER.

8.03 *Furnish Data*

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

8.04 *Pay Promptly When Due*

A. OWNER shall make payments to CONTRACTOR promptly when they are due as provided in paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. OWNER's duties in respect of providing lands and easements and providing engineering surveys to

establish reference points are set forth in paragraphs 4.01 and 4.05. Paragraph 4.02 refers to OWNER's identifying and making available to CONTRACTOR copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by ENGINEER in preparing the Contract Documents.

8.06 *Insurance*

A. OWNER's responsibilities, if any, in respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. OWNER is obligated to execute Change Orders as indicated in paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. OWNER's responsibility in respect to certain inspections, tests, and approvals is set forth in paragraph 13.03.B.

8.09 *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.

8.10 *Undisclosed Hazardous Environmental Condition*

A. OWNER's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. If and to the extent OWNER has agreed to furnish CONTRACTOR reasonable evidence that financial arrangements have been made to satisfy OWNER's obligations under the Contract Documents, OWNER's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *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 Documents and will not be changed without written consent of OWNER and ENGINEER.

9.02 *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 9.10, and 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.

9.03 *Project Representative*

A. If OWNER and ENGINEER agree, ENGINEER will furnish a Resident Project Representative to assist ENGINEER in providing more extensive observation of the Work. The responsibilities and authority and limitations thereon of any such Resident Project Representative and assistants will be as provided in paragraph 9.10 and in the Supplementary Conditions. 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.

9.04 *Clarifications and Interpretations*

A. ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents as ENGINEER may determine necessary, which shall be consistent with the intent of and reasonably inferable from the Contract Documents. Such written clarifications and interpretations will be binding on OWNER and CONTRACTOR. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a written clarification or interpretation, a Claim may be made therefor as provided in paragraph 10.05.

9.05 *Authorized Variations in Work*

A. ENGINEER may authorize minor variations in the Work from the requirements of the Contract Documents which 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. These may be accomplished by a Field Order and will be binding on OWNER and also on CONTRACTOR, who shall perform the Work involved promptly. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of a Field Order, a Claim may be made therefor as provided in paragraph 10.05.

9.06 *Rejecting Defective Work*

A. ENGINEER will have authority to disapprove or reject Work which ENGINEER believes to be defective, or that ENGINEER believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. ENGINEER will also have authority to require special inspection or testing of the Work as provided in paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.07 *Shop Drawings, Change Orders and Payments*

A. In connection with ENGINEER's authority as to Shop Drawings and Samples, see paragraph 6.17.

B. In connection with ENGINEER's authority as to Change Orders, see Articles 10, 11, and 12.

C. In connection with ENGINEER's authority as to Applications for Payment, see Article 14.

9.08 *Determinations for Unit Price Work*

A. 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 paragraph 10.05.

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

A. ENGINEER will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. Claims, disputes and other matters relating to the acceptability of the Work, the quantities and classifications of Unit Price Work, the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, and Claims seeking changes in the Contract Price or Contract Times will be referred initially to ENGINEER in writing, in accordance with the provisions of paragraph 10.05, with a request for a formal decision.

B. When functioning as interpreter and judge under this paragraph 9.09, ENGINEER will not show partiality to OWNER or CONTRACTOR and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity. The rendering of a decision by ENGINEER pursuant to this paragraph 9.09 with respect to any such Claim, dispute, or other matter (except any which have been waived by the making or acceptance of final payment as provided in paragraph 14.07) will be a condition precedent to any exercise by OWNER or CONTRACTOR of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such Claim, dispute, or other matter.

9.10 *Limitations on ENGINEER's Authority and Responsibilities*

A. Neither ENGINEER's authority or responsibility under this Article 9 or under any other provision of the

Contract Documents 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 14.07.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 9.10 shall also apply to ENGINEER's Consultants, Resident Project Representative, and assistants.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Agreement and without notice to any surety, OWNER may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Written Amendment, a Change Order, or a Work Change Directive. Upon receipt of any such document, CONTRACTOR shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If OWNER and CONTRACTOR are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in paragraph 10.05.

10.02 *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 as provided in paragraph 3.04, except in the case of an emergency as provided in paragraph 6.16 or in the case of uncovering Work as provided in paragraph 13.04.B.

10.03 *Execution of Change Orders*

A. OWNER and CONTRACTOR shall execute appropriate Change Orders recommended by ENGINEER (or Written Amendments) covering:

1. changes in the Work which are: (i) ordered by OWNER pursuant to paragraph 10.01.A, (ii) required because of acceptance of defective Work under paragraph 13.08.A or OWNER's correction of defective Work under paragraph 13.09, or (iii) agreed to by the parties;

2. 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; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by ENGINEER pursuant to paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, CONTRACTOR shall carry on the Work and adhere to the progress schedule as provided in paragraph 6.18.A.

10.04 *Notification to Surety*

A. If notice 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) is required by the provisions of any Bond to be

given to a surety, 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.

10.05 *Claims and Disputes*

A. *Notice:* Written notice stating the general nature of each Claim, dispute, or other matter shall be delivered by the claimant to ENGINEER and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. Notice of the amount or extent of the Claim, dispute, or other matter with supporting data shall be delivered to the ENGINEER and the other party to the Contract within 60 days after the start of such event (unless ENGINEER allows additional time for claimant to submit additional or more accurate data in support of such Claim, dispute, or other matter). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to ENGINEER and the claimant within 30 days after receipt of the claimant's last submittal (unless ENGINEER allows additional time).

B. *ENGINEER's Decision:* ENGINEER will render a formal decision in writing within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any. ENGINEER's written decision on such Claim, dispute, or other matter will be final and binding upon OWNER and CONTRACTOR unless:

1. an appeal from ENGINEER's decision is taken within the time limits and in accordance with the dispute resolution procedures set forth in Article 16; or
2. if no such dispute resolution procedures have been set forth in Article 16, a written notice of intention to appeal from ENGINEER's written decision is delivered by OWNER or CONTRACTOR to the other and to ENGINEER within 30 days after the date of such decision, and a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction within 60 days after the date of such decision or within 60 days after Substantial Completion, whichever is later (unless otherwise agreed in writing by OWNER and CONTRACTOR), to exercise such rights or remedies as the appealing party may have with

respect to such Claim, dispute, or other matter in accordance with applicable Laws and Regulations.

C. If ENGINEER does not render a formal decision in writing within the time stated in paragraph 10.05.B, a decision denying the Claim in its entirety shall be deemed to have been issued 31 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any.

D. No Claim for an adjustment in Contract Price or Contract Times (or Milestones) will be valid if not submitted in accordance with this paragraph 10.05.

ARTICLE 11 - COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs necessarily incurred and paid by CONTRACTOR in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to CONTRACTOR will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by OWNER, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in paragraph 11.01.B.

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 at the Site. 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, 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 11.01.

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, 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 5.06.D), 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 telegrams, long distance telephone calls, telephone service at the Site, expressage, and similar petty cash items in connection with the Work.

i. When the Cost of the Work is used to determine the value of a Change Order or of a Claim, the cost of premiums for additional Bonds and insurance required because of the changes in the Work or caused by the event giving rise to the Claim.

j. When all the Work is performed on the basis of cost-plus, the costs of premiums for all Bonds

and insurance CONTRACTOR is required by the Contract Documents to purchase and maintain.

B. *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, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by CONTRACTOR, whether at the Site or in CONTRACTOR's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 11.01.A.1 or specifically covered by paragraph 11.01.A.4, all of which 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 paragraphs 11.01.A and 11.01.B.

C. *CONTRACTOR's Fee:* When all the Work 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 or when a Claim for an 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 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to paragraphs 11.01.A and 11.01.B, 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.

11.02 *Cash 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 as may be acceptable to OWNER and ENGINEER. CONTRACTOR agrees that:

1. the 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 costs, overhead, profit, and other expenses contemplated for the 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.

B. 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.

11.03 *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. 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. Determinations of the actual quantities and classifications of Unit Price Work performed by CONTRACTOR will be made by ENGINEER subject to the provisions of paragraph 9.08.

B. 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.

C. OWNER or CONTRACTOR may make a Claim for an adjustment in the Contract Price in accordance with paragraph 10.05 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; and

2. there is no corresponding adjustment with respect any other item of Work; and

3. if CONTRACTOR believes that CONTRACTOR 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 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order or by a Written Amendment. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the ENGINEER and the other party to the Contract in accordance with the provisions of paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for 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, by application of such unit prices to the quantities of the items involved (subject to the provisions of paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in paragraph 11.01) plus a CONTRACTOR's fee for overhead and profit (determined as provided in paragraph 12.01.C).

C. *CONTRACTOR's Fee:* 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 11.01.A.1 and 11.01.A.2, the CONTRACTOR's fee shall be 15 percent;

b. for costs incurred under paragraph 11.01.A.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 paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and CONTRACTOR will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

d. no fee shall be payable on the basis of costs itemized under paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

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 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times (or Milestones) may only be changed by a Change Order or by a Written Amendment. Any Claim for an adjustment in the Contract Times (or Milestones) shall be based on written notice submitted by the party making the claim to the ENGINEER and the other

party to the Contract in accordance with the provisions of paragraph 10.05.

B. Any adjustment of the Contract Times (or Milestones) covered by a Change Order or of any Claim for an adjustment in the Contract Times (or Milestones) will be determined in accordance with the provisions of this Article 12.

12.03 *Delays Beyond CONTRACTOR's Control*

A. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of CONTRACTOR, the Contract Times (or Milestones) will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in paragraph 12.02.A. Delays beyond the control of CONTRACTOR shall include, but not be limited to, acts or neglect by OWNER, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

12.04 *Delays Within CONTRACTOR's Control*

A. The Contract Times (or Milestones) will not be extended due to delays within the control of CONTRACTOR. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of CONTRACTOR.

12.05 *Delays Beyond OWNER's and CONTRACTOR's Control*

A. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of both OWNER and CONTRACTOR, an extension of the Contract Times (or Milestones) in an amount equal to the time lost due to such delay shall be CONTRACTOR's sole and exclusive remedy for such delay.

12.06 *Delay Damages*

A. In no event shall OWNER or ENGINEER be liable to CONTRACTOR, any Subcontractor, any Supplier, or any other person or organization, or to any surety for or employee or agent of any of them, for damages arising out of or resulting from:

1. delays caused by or within the control of CONTRACTOR; or
2. delays beyond the control of both OWNER and CONTRACTOR including but not limited to fires, floods, epidemics, abnormal

weather conditions, acts of God, or acts or neglect by utility owners or other contractors performing other work as contemplated by Article 7.

B. Nothing in this paragraph 12.06 bars a change in Contract Price pursuant to this Article 12 to compensate CONTRACTOR due to delay, interference, or disruption directly attributable to actions or inactions of OWNER or anyone for whom OWNER is responsible.

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which OWNER or ENGINEER has actual knowledge will be given to CONTRACTOR. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

A. OWNER, ENGINEER, ENGINEER's Consultants, other representatives and personnel of OWNER, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. CONTRACTOR shall provide them proper and safe conditions for such access and advise them of CONTRACTOR's Site safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

A. CONTRACTOR shall give ENGINEER timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. OWNER shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by paragraphs 13.03.C and 13.03.D below;
2. that costs incurred in connection with tests or inspections conducted pursuant to paragraph 13.04.B shall be paid as provided in said paragraph 13.04.B; and

3. as otherwise specifically provided in the Contract Documents.

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 and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for OWNER's and ENGINEER's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to CONTRACTOR's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to OWNER and ENGINEER.

E. 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, it must, if requested by ENGINEER, be uncovered for observation.

F. Uncovering Work as provided in paragraph 13.03.E shall be at CONTRACTOR's expense unless CONTRACTOR has given ENGINEER timely notice of CONTRACTOR's intention to cover the same and ENGINEER has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of ENGINEER, it must, if requested by ENGINEER, be uncovered for ENGINEER's observation and replaced at CONTRACTOR's expense.

B. If ENGINEER considers it necessary or advisable that covered Work be observed by ENGINEER or inspected or tested by others, 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, furnishing all necessary labor, material, and equipment. If it is found that such Work is defective, 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 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 OWNER shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, OWNER may make a Claim therefor as provided in paragraph 10.05. If, however, such 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 Milestones), 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, CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

13.05 *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, 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.

13.06 *Correction or Removal of Defective Work*

A. CONTRACTOR shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by ENGINEER, remove it from the Project and replace it with Work that is not defective. 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 removal (including but not limited to all costs of repair or replacement of work of others).

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or 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 land or areas made available for CONTRACTOR's use by OWNER or permitted by Laws and Regulations as contemplated in paragraph 6.11.A is found to be defective, CONTRACTOR shall promptly, without cost to OWNER and in accordance with

OWNER's written instructions: (i) repair such defective land or areas, or (ii) correct such defective Work or, if the defective Work has been rejected by OWNER, remove it from the Project and replace it with Work that is not defective, and (iii) satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom. If CONTRACTOR does not promptly comply with the terms of such 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, and 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) will be paid by CONTRACTOR.

B. 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 or by Written Amendment.

C. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph 13.07, 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.

D. CONTRACTOR's obligations under this paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, OWNER (and, prior to ENGINEER's recommendation of final payment, ENGINEER) prefers to accept it, OWNER may do so. 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) attributable to OWNER's evaluation of and determination to accept such defective Work (such costs to be approved by ENGINEER as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by CONTRACTOR pursuant to this sentence. If any such

acceptance occurs prior to ENGINEER's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and OWNER shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, OWNER may make a Claim therefor as provided in paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by CONTRACTOR to OWNER.

13.09 *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 in accordance with paragraph 13.06.A, 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, OWNER may, after seven days written notice to CONTRACTOR, correct and remedy any such deficiency.

B. In exercising the rights and remedies under this paragraph, OWNER shall proceed expeditiously. In connection with such corrective and 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, take possession of CONTRACTOR's tools, appliances, construction equipment and machinery at the Site, 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 (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) incurred or sustained by OWNER in exercising the rights and remedies under this paragraph 13.09 will be charged against CONTRACTOR, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, OWNER may make a Claim therefor as provided in paragraph 10.05. 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 (or Milestones) 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 13.09.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 Schedule of Values

A. The schedule of values established as provided in paragraph 2.07.A 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.

14.02 Progress Payments

A. Applications for Payments

1. At least 20 days before the date established 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 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 pro-gress payments will be as stipulated in the Agreement.

B. Review of Applications

1. ENGINEER will, within 10 days after receipt of each Application for Payment, 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 on the Site 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, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under paragraph 9.08, and to 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: (i) 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 Documents; or (ii) that 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 to supervise, direct, or control the Work or for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for CONTRACTOR's failure to comply with Laws and Regulations applicable to CONTRACTOR's performance of the Work. Additionally, said review or recommendation will not impose responsibility on ENGINEER to make any examination to ascertain how or for what purposes CONTRACTOR has used the moneys paid on account of the Contract Price, or 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 referred to in paragraph 14.02.B.2. ENGINEER may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in ENGINEER's opinion to protect OWNER from loss because:

a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;

b. the Contract Price has been reduced by Written Amendment or Change Orders;

c. OWNER has been required to correct defective Work or complete Work in accordance with paragraph 13.09; or

d. ENGINEER has actual knowledge of the occurrence of any of the events enumerated in paragraph 15.02.A.

C. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to OWNER with

ENGINEER's recommendation, the amount recommended will (subject to the provisions of paragraph 14.02.D) become due, and when due will be paid by OWNER to CONTRACTOR.

D. *Reduction in Payment*

1. OWNER may refuse to make payment of the full amount recommended by ENGINEER because:

a. claims have been made against OWNER on account of CONTRACTOR's performance or furnishing of the Work;

b. 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;

c. there are other items entitling OWNER to a set-off against the amount recommended; or

d. OWNER has actual knowledge of the occurrence of any of the events enumerated in paragraphs 14.02.B.5.a through 14.02.B.5.c or paragraph 15.02.A.

2. If OWNER refuses to make payment of the full amount recommended by ENGINEER, OWNER must give CONTRACTOR immediate written notice (with a copy to ENGINEER) stating the reasons for such action 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, when CONTRACTOR corrects to OWNER's satisfaction the reasons for such action.

3. If it is subsequently determined that OWNER's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by paragraph 14.02.C.1.

14.03 *CONTRACTOR's Warranty of Title*

A. CONTRACTOR warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to OWNER no later than the time of payment free and clear of all Liens.

14.04 *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 (except for items specifically listed by CONTRACTOR as incomplete) and request that ENGINEER issue a certificate of Substantial Completion. Promptly thereafter, 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. If ENGINEER considers the Work substantially complete, ENGINEER will prepare and deliver to OWNER a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. OWNER shall have seven days after receipt of the tentative certificate during which to make written objection to ENGINEER as to any provisions of the certificate or attached list. If, after considering such objections, ENGINEER concludes that the Work is not substantially complete, ENGINEER will within 14 days after submission of the tentative certificate to OWNER notify CONTRACTOR in writing, stating the reasons therefor. If, after consideration of OWNER's objections, ENGINEER considers the Work substantially complete, ENGINEER will within said 14 days execute and deliver to OWNER and CONTRACTOR a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as ENGINEER believes justified after consideration of any objections from OWNER. At the time of delivery of the tentative certificate of Substantial Completion ENGINEER will deliver to OWNER and CONTRACTOR a written recommendation as to division of responsibilities pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless OWNER and CONTRACTOR agree otherwise in writing and so inform ENGINEER in writing prior to ENGINEER's issuing the definitive certificate of Substantial Completion, ENGINEER's aforesaid recommendation will be binding on OWNER and CONTRACTOR until final payment.

B. OWNER shall have the right to exclude CONTRACTOR from the Site after the date of Substantial Completion, but OWNER shall allow CONTRACTOR reasonable access to complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Use by OWNER at OWNER's option of 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, may be accomplished prior to Substantial Completion of all the Work subject to the following conditions.

1. OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended use and substantially complete. If CONTRACTOR agrees that such part of the Work is substantially complete, CONTRACTOR will certify to OWNER and ENGINEER that such part of the Work is substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. CONTRACTOR at any time may notify OWNER and ENGINEER in writing that CONTRACTOR considers any such part of the Work ready for its intended use and substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. 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 14.04 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.

2. No occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of paragraph 5.10 regarding property insurance.

14.06 *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 is incomplete or defective. CONTRACTOR shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *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, marked-up record documents (as provided in paragraph 6.12), and other documents, CONTRACTOR may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by: (i) all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by subparagraph 5.04.B.7; (ii) consent of the surety, if any, to final payment; and (iii) complete and legally effective releases or waivers (satisfactory to OWNER) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in paragraph 14.07.A.2 and as approved by OWNER, CONTRACTOR may furnish receipts or releases in full and an affidavit of CONTRACTOR that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which OWNER or OWNER's property might in any way be responsible 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.

B. *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 docu-

mentation as required by the Contract Documents, ENGINEER is satisfied that the Work has been completed and CONTRACTOR's other obligations under the Contract Documents have been fulfilled, ENGINEER will, within ten days after receipt of the final Application for Payment, indicate in writing ENGINEER's recommendation of payment and present the Application for Payment to OWNER for payment. 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 14.09. 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. *Payment Becomes Due*

1. Thirty days after the presentation to OWNER of the Application for Payment and accompanying documentation, the amount recommended by ENGINEER will become due and, when due, will be paid by OWNER to CONTRACTOR.

14.08 *Final Completion Delayed*

A. If, through no fault of CONTRACTOR, final completion of the Work is significantly delayed, and if ENGINEER so confirms, OWNER shall, upon receipt of CONTRACTOR's final Application for Payment and recommendation of ENGINEER, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by OWNER for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required in paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by CONTRACTOR to ENGINEER with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by OWNER against CONTRACTOR, except Claims arising

from unsettled Liens, from defective Work appearing after final inspection pursuant to paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from CONTRACTOR's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by CONTRACTOR against OWNER other than those previously made in writing which are still unsettled.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.01 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 notice in writing to CONTRACTOR and ENGINEER which will fix the date on which Work will be resumed. CONTRACTOR shall resume the Work on the date so fixed. CONTRACTOR shall be allowed an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if CONTRACTOR makes a Claim therefor as provided in paragraph 10.05.

15.02 OWNER May Terminate for Cause

A. The occurrence of any one or more of the following events will 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 established under paragraph 2.07 as adjusted from time to time pursuant to paragraph 6.04);

2. CONTRACTOR's disregard of Laws or Regulations of any public body having jurisdiction;

3. CONTRACTOR's disregard of the authority of ENGINEER; or

4. CONTRACTOR's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in paragraph 15.02.A occur, OWNER may, after giving

CONTRACTOR (and the surety, if any) seven days written notice, terminate the services of CONTRACTOR, exclude CONTRACTOR from the Site, and take possession of the Work and of all CONTRACTOR's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by CONTRACTOR (without liability to CONTRACTOR for trespass or conversion), 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 finish the Work as OWNER may deem expedient. In such case, CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds 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) sustained by OWNER arising out of or relating to completing the Work, such excess will be paid to CONTRACTOR. If such claims, costs, losses, and damages exceed 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.

C. 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. Any retention or payment of moneys due CONTRACTOR by OWNER will not release CONTRACTOR from liability.

15.03 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, elect to terminate the Contract. In such case, CONTRACTOR shall be paid (without duplication of any items):

1. for 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. for 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;

3. for 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) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. for reasonable expenses directly attributable to termination.

B. CONTRACTOR shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *CONTRACTOR May Stop Work or Terminate*

A. If, through no act or fault of CONTRACTOR, the Work is suspended for more than 90 consecutive days by OWNER or under an order of court or other public authority, or ENGINEER fails to act on any Application for Payment within 30 days after it is submitted, or 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 15.03. 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 15.04 are not intended to preclude CONTRACTOR from making a Claim under paragraph 10.05 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 16 - DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Dispute resolution methods and procedures, if any, shall be as set forth in the Supplementary Conditions. If no method and procedure has been set forth, and subject

to the provisions of paragraphs 9.09 and 10.05, OWNER and CONTRACTOR may exercise such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any dispute.

ARTICLE 17 - MISCELLANEOUS

17.01 *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 delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

A. When any period of time is referred to in the Contract Documents 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.

17.03 *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 Documents, and 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.

17.04 *Survival of Obligations*

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

17.05 *Controlling Law*

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

SECTION 008000 - SUPPLEMENTARY CONDITIONS

The terms in the Supplementary Conditions will have the same meaning as in the General Conditions of the Construction Contract (EJCDC No. 1910-8, 1996). The General Conditions are amended as follows:

- SC-1.** 1.01 A.3 – Add “OWNER and” after the initial phrase “The form acceptable to”.
- SC-2.** 1.01 A.8 – Add the following phrase to the end of the definition: “, such as warranty bonds, if applicable.”
- SC-3.** Add the following subparagraphs after subparagraph 1.01 A.8:
- “8a. *Certificate of Final Completion* – A certificate issued by the ENGINEER, after review and approval by ENGINEER to the CONTRACTOR certifying that all of the conditions of Final Completion have been met and the requirements to receive approval of the Final Application for Payment achieved, in accordance with the Contract Documents and to the satisfaction of OWNER. Once the Certificate of Final Completion has been issued by the ENGINEER, final payment shall be due and payable and all applicable warranties on the Work shall commence. To receive this certificate, the CONTRACTOR must submit in writing to the ENGINEER the CONTRACTOR’s Final Application for Payment.
- 8b. *Certificate of Substantial Completion* – A certificate issued by the ENGINEER, after review and approval by ENGINEER to the CONTRACTOR certifying that all of the conditions of Substantial Completion have been met in accordance with the Contract Documents and to the satisfaction of OWNER.”
- SC-4.** 1.01 A.9. – Delete this definition in its entirety and replace with the following:
- “*Change Order* – An executed agreement between ENGINEER, CONTRACTOR and OWNER required for any of the following: changes in Drawings and Specifications necessary after the performance of the Work has commenced; changes which increase and/or decrease the Contract Price and/or Cost of Work; changes which increase or decrease Contract Times; changes which impact the anticipated service life of the Work; and/or changes that significantly impact operation and maintenance, issued on or after the Effective Date of the Agreement.”
- SC-5.** 1.01 A.12 – Delete the following from this definition: the term “Work Change Directives,”.
- SC-6.** 1.01 A.19 – Delete this definition in its entirety and replace with the following:
- “*ENGINEER* – This term shall mean **Gannett Fleming, Inc., 3838 N. Central Ave, Suite 1900, Phoenix AZ 85012**, or its designated representative and shall include any individual or entity having a contract with ENGINEER to furnish services as ENGINEER’s independent professional associate or consultant with respect to the Project.
- SC-7.** 1.01 A.20 - Delete this definition in its entirety.
- SC-8.** 1.01 A.21 – Delete this definition in its entirety and replace with the following:
- “*Field Order* – written agreement, by and between ENGINEER, CONTRACTOR and OWNER, required for any changes which do not rise to the level of a Change Order as defined herein, and issued on or after the Effective Date of the Agreement.”

SC-9. Add the following subparagraphs after subparagraph 1.01 A.21:

“21a. *Final Application for Payment* – the Application for Payment requested once the CONTRACTOR believes the Work has reached Final Completion. The Final Application for Payment shall include all supporting documentation required in the Contract Documents.

21b. *Final Completion* – The time at which: 1) all Work, in the opinion of the ENGINEER (such opinion to be subject to the concurrence of the OWNER), has been satisfactorily completed in accordance with any and all requirements of the Contract Documents, including completion of all corrections and/or modifications identified during Final Inspection; 2) all Project closeout documentation has been submitted, reviewed and approved, in accordance with provisions and requirements of the Contract Documents; 3) any and all other obligations of the CONTRACTOR that must be completed prior to Final Completion have been satisfactorily completed; 4) and a Certificate of Final Completion has been issued.

21c. *Final Inspection* – A scheduled inspection, conducted by the ENGINEER, CONTRACTOR, and OWNER, to determine whether all Work performed under this Project has been successfully completed in accordance with the Contract Documents. Final Inspection shall include all required re-inspections necessary due to incomplete, non-conforming, unacceptable and/or defective Work.

21d. *General Conditions* – These Standard General Conditions.”

SC-10. 1.01 A.22 – Delete this definition in its entirety.

SC-11. Add the following subparagraph after subparagraph 1.01 A.35:

“35a. *Proposed Contract Modification (PCM)* – A requested deviation from the Contract Documents, including, but not limited to, substitutes and/or “or equals”, proposed by CONTRACTOR, ENGINEER or OWNER, which must be submitted in writing to all parties for approval. In the event the PCM meets the requisites for a Change Order and is agreed to by all the parties, a Change Order will be issued authorizing the change.”

SC-12. Add the following subparagraph after subparagraph 1.01 A.36:

“36a. *Request for Interpretation (RFI)* – A written request by CONTRACTOR for an interpretation of any Drawings, Specifications, Samples, Shop Drawings or other Contract Documents from the ENGINEER related to the Work. CONTRACTOR shall provide copies of all RFIs to both ENGINEER and OWNER.”

SC-13. 1.01 A.37 – Delete this definition in its entirety and replace with the following:

“*Resident Project Representative*--An authorized third-party representative retained by OWNER who may be assigned to the Site or any part thereof.”

SC-14. Add the following subparagraph after subparagraph 1.01 A.42:

“42a. *Submittals* – All Drawings, Shop Drawings, Specifications, PCMs, Requests for Interpretations, or any other document required to be submitted in writing to the ENGINEER by the CONTRACTOR. An Application for Payment shall not be considered a Submittal.”

SC-15. 1.01 A.49 – Delete this subparagraph in its entirety.

SC-16. 1.02 B.1. – Add “, and is any day of the year, no days being excepted.” to the end of this subparagraph.

- SC-17.** 1.02 C.1. – Amend the end of this subparagraph to read as follows:
- “or has been damaged prior to Final Completion.”
- SC-18.** 2.02 A. – In the first sentence of this paragraph, delete “up to ten copies” and replace with “at least five copies”.
- SC-19.** 2.03 A. – Delete this paragraph in its entirety and replace with the following:
- “The Contract Times will commence to run on the date set forth by the OWNER in the Notice to Proceed. The Notice to Proceed shall be given on or before the ninetieth day after the Effective Date of the Agreement.”
- SC-20.** 2.05 A. – Delete this paragraph in its entirety and replace with the following:
- “A. *CONTRACTOR’s Review of Contract Documents and Field Verification:* Before undertaking each part of the Work, CONTRACTOR shall: carefully study and compare the Contract Documents and check and verify figures therein and all applicable field measurements; and field verify all information pertaining to the Work. As a part of this process, CONTRACTOR shall conduct any necessary field verifications related to Contract Document requirements. CONTRACTOR shall promptly report in writing to ENGINEER any conflict, error, omission, ambiguity or discrepancy which CONTRACTOR may discover and shall obtain a written interpretation or clarification from ENGINEER before proceeding with any work affected thereby. In the event of a conflict in the Drawings, Specifications, or other portions of the Contract Documents which were not reported prior to the Bidding of the Contract, the CONTRACTOR shall be deemed to have included the most expensive in his Bid.”
- SC-21.** 2.05 C. – Delete this paragraph in its entirety and replace with the following:
- “*Evidence of Insurance:* Before any Work at the Site is started, CONTRACTOR shall deliver to the OWNER, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which OWNER or any additional insured may reasonably request) which CONTRACTOR is required to purchase and maintain in accordance with Article 5.”
- SC-22.** 2.06 A. – Modify this paragraph to read as follows:
- “Within 20 days after the Effective Date of the Agreement, but before any Work at the Site is started, a conference attended by CONTRACTOR, ENGINEER, OWNER and others as appropriate will be scheduled to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in paragraph 2.05.B, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.”
- SC-23.** 2.07 A. – Amend the first sentence of this paragraph to read as follows:
- “Unless otherwise provided in the Contract Documents, at least ten days before submission of the first Application for Payment, a conference attended by CONTRACTOR, ENGINEER, OWNER and others as appropriate will be held to review for acceptability to ENGINEER and OWNER as provided below the schedules submitted in accordance with paragraph 2.05.B.”
- SC-24.** 2.07 A. – Add the following subparagraph to this section after subparagraph 3:
- “4. Acceptance of the Contract completion schedule in no way affects the Contract Times.”

SC-25. Immediately after paragraph 2.07, add a new paragraph to read as follows:

"2.08 Progress Schedule Submittals

A. The Contract Times may be changed only as set forth in Article 12 of the General Conditions, and a progress schedule shall not constitute a change in the Contract Times."

SC-26. Immediately after paragraph 2.08, add a new paragraph to read as follows:

"2.09 Forms and Submittal Procedures

A. CONTRACTOR shall submit Submittals, Change Orders, Contract Modification Requests, Requests for Information, Applications for Payment, and any other document/communication to be submitted or made available under the Contract Documents for any reason on forms approved in writing by and/or provided by OWNER and in electronic formats as approved and/or required by OWNER. Any such forms shall be submitted in accordance with procedures and processes established in writing by the OWNER, which forms, procedures, and processes may be amended or modified by OWNER from time to time in OWNER's sole discretion. Such submittal procedures may include but are not limited to: the necessary forms, attachments, number of copies, required formatting, routing, transmittal mechanics, transmittal contents, required timeframes, ENGINEER review actions, and resubmittal procedures. In addition, CONTRACTOR shall acquire and utilize any necessary programs for electronic submittals."

SC-27. Immediately after paragraph 2.09, add a new paragraph to read as follows:

"2.10 Normal Project Working Hours

A. Normal Project working hours for this Project are Monday through Friday between the hours of 8:00am and 5:00pm. Work shall not be permitted on Saturdays, Sundays or any of the following holidays: New Year, President's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, unless written permission is requested by the Contractor and approved by the Engineer at least 72 hours prior to the Work taking place. The Owner will require that a representative of the Owner be present or available for Work which occurs outside of the normal Project working hours. The Contractor shall compensate the Owner for salary costs incurred by the Owner as a result of the Contractor choosing to work outside the normal Project working hours."

SC-28. 3.01 – Add the following paragraph to this section:

"D. The Contract Documents comprise the entire Contract between OWNER and CONTRACTOR. The Contract Documents may be altered only by a Written Amendment or Change Order."

SC-29. 3.03.A.1. – Amend this subparagraph as follows:

In the first sentence of the subparagraph, insert "omission," between "error," and "ambiguity".

Delete the following language from the end of the subparagraph:

"; provided, however, that CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any such conflict, error, ambiguity or discrepancy unless CONTRACTOR knew or reasonably should have known thereof."

and replace with the following:

“. In the event of a conflict in the Drawings, Specifications, or other portions of the Contract Documents which were not reported prior to the Bidding of the Contract, the CONTRACTOR shall be deemed to have included the most expensive in his Bid.”

SC-30. 3.03 B.1. – Insert “omission,” between “error,” and “ambiguity”.

SC-31. Add the following subparagraph after 3.03 B.1.b.:

“2. Except as may be otherwise specifically stated in the Contract Documents, if two or more standards, specifications, codes, or instructions are specified, and they establish conflicting requirements, CONTRACTOR shall comply with the most stringent requirement, as determined by the ENGINEER.

SC-32. 3.04 A. – Modify this paragraph to read as follows;

“The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by a Written Amendment or a Change Order.”

SC-33. 4.01 B – Delete this paragraph in its entirety.

SC-34. 4.02 A – Delete the following language: “The Supplementary Conditions identify:”

SC-35. 4.02 A.1. – Add “shall be provided by ENGINEER upon request” to the end of this subparagraph.

SC-36. 4.02 A.2. – Add “shall be provided by ENGINEER upon request” to the end of this subparagraph.

SC-37. 4.02 B. – Modify this paragraph as follows:

Delete the following sentence:

“Such ‘Technical data’ is identified in the Supplementary Conditions.”

Modify the last sentence in this paragraph to read as follows:

“Except for such reliance on such “technical data,” CONTRACTOR may not rely upon or make any Claim against OWNER, and/or ENGINEER, with respect to:”

SC-38. 4.02 B.1. – Add “and/or presence of any third-party infrastructure” to the end of this subparagraph after “incident thereto,”.

SC-39. 4.03 A. – Modify the paragraph following subparagraph 4. as follows:

After “CONTRACTOR shall”, delete “promptly” and replace with “within three (3) days”

Add the following language to the end of the first sentence:

“, such notice to (i) clearly and unequivocally state which category or categories described in this paragraph 4.03.A, the condition meets; (ii) state that such notice is given pursuant to this paragraph 4.03.A; and (iii) clearly describe how and to what extent such condition will impact CONTRACTOR’s Work”

SC-40. 4.03 B. – After “obtaining additional”, add “information from CONTRACTOR and/or additional”.

SC-41. 4.03 C.2.b. – After “Site and contiguous areas”, delete “required” and replace with “permitted”.

SC-42. 4.04 A. – Delete “Supplementary Conditions” at the end of the paragraph and replace with

“Contract Documents”.

SC-43. 4.04 B.1. – In the first sentence, after “CONTRACTOR shall”, delete “promptly” and replace with “within three (3) days”.

SC-44. 4.04 B.2. – Modify this subparagraph as follows:

In the first sentence, delete “a Work Change Directive or”

In the second sentence, after “Contract Price” delete “of” and replace with “or”.

SC-45. 4.06 A. – Amend this paragraph to read as follows:

“A. *Reports and Drawings:* Those available reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the ENGINEER in the preparation of the Contract Documents shall be provided by ENGINEER upon CONTRACTOR’s request.”

SC-46. 4.06 B. – Delete the second sentence from this paragraph.

SC-47. 4.06 C – At the end of the first sentence, add “; however, CONTRACTOR shall be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which results from activities of the CONTRACTOR not contemplated by the scope of the Work”.

SC-48. 4.06 G. – Delete this paragraph in its entirety.

SC-49. 4.06 H. – Amend this paragraph by deleting “ENGINEER’s Consultants” and deleting the last sentence.

SC-50. 5.01 A. – Delete this paragraph in its entirety and replace with the following:

A. CONTRACTOR shall furnish performance and payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all CONTRACTOR’s obligations under the Contract Documents. These Bonds shall remain in effect at least until issuance of the Certificate of Final Completion, except as provided otherwise by Laws or Regulations or by the Contract Documents. CONTRACTOR shall also furnish such other Bonds as are required by the Contract Documents, including, without limitations a warranty bond to be in effect for the entirety of the warranty period as set forth in paragraph 13.07, including any extensions thereof.”

SC-51. 5.01 B. – Delete this paragraph in its entirety and replace with the following:

“B. All Bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by laws or regulations, and shall be executed by such sureties that meet the following criteria:

1. Authorized to do business in Texas
2. Authorized to issue payment and performance bonds in the amount required for the contract and:
 - a. a rating of at least B from Best’s Key Rating Guide; or
 - b. if the surety company does not have any such rating due to the length of time it has been a surety company, it must demonstrate eligibility to participate in the surety bond guarantee program of Small Business Administration and must be an approved surety

company listed in the current United States Department of Treasury Circular 570. Such performance and payment bonds shall meet the criteria contained in rules and regulations promulgated by the United States Department of Treasury with respect to performance and payment bonds for federal jobs, including specifically the rules related to the underwriting limitation.”

SC-52. 5.01 – Add the following paragraph after paragraph 5.01 C.:

“D. The performance bond shall contain a provision providing OWNER the right to engage the services of the SURETY under the performance bond in the event CONTRACTOR fails or is failing to perform any obligation and/or obligations set forth in the Contract, as provided in the Contract. Indulgence or forbearance by the OWNER to so engage the SURETY if CONTRACTOR fails or is failing to perform an obligation set forth in the Contract shall not constitute a waiver of OWNER’s rights under the Bond or OWNER’s right to engage the SURETY regarding such failure or any other failure at a future time.”

SC-53. 5.03 A. – Delete the last sentence from this paragraph.

SC-54. 5.04 A. –Add the following language in a separate paragraph following subparagraph 2:

“The limits of liability for the insurance required by subparagraphs 5.04 A.1 and A.2. shall provide the following coverage for not less than the following amounts or greater where required by Laws and Regulations.

Workers' Compensation, etc., under paragraphs 5.04.A.1 and A.2. of the General Conditions:	
State:	Statutory
Applicable Federal (e.g., Longshore)	Statutory
Employers' Liability:	
Bodily Injury by Accident	\$1,000,000
Bodily Injury by Disease - Each Employee	\$1,000,000
Bodily Injury by Disease - Policy Limit	\$1,000,000
Maritime Coverage Endorsement	
Insurance shall include a waiver of subrogation in favor of the OWNER, its officers, employees and agents.	

SC-55. 5.04 A. –Add the following language in a separate paragraph following subparagraph 5:

“Contractor's Liability Insurance under subparagraphs 5.04 A.3., A.4. and A.5. shall also include completed operations and product liability coverage, and shall eliminate the exclusion with respect to property under the care, custody and control of CONTRACTOR:

General Aggregate (Except Products - Completed Operations)	\$1,000,000 / Occurrence \$2,000,000 / Aggregate
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Products - Completed Operations Aggregate	\$1,000,000 / Occurrence \$2,000,000 / Aggregate
Personal and Advertising Injury (One Person/Organization)	\$1,000,000
Each Occurrence (Bodily Injury and Property Damage)	\$1,000,000
Limit Per Person - Medical Expense	\$5,000
Personal Injury Liability coverage will include claims arising out of Employment Practices Liability, limited to coverage provided under standard contract	\$1,000,000
Property Damage Liability insurance will provide explosion, collapse and underground coverage where applicable	\$1,000,000
Watercraft Liability Policy: Coverage shall apply to all self propelled vessels	Not Required
Excess Liability. General Aggregate - Each Occurrence	\$1,000,000
Asbestos General Liability insurance	\$5,000,000
Pollution Liability	\$1,000,000

“

SC-56. 5.04 A.6. –Add the following language in a separate paragraph following subparagraph 6:

“Contractor's Automobile Liability Insurance under this paragraph shall also include:

Bodily Injury:	
Each Person	\$1,000,000
Each Accident	\$1,000,000
Property Damage - Each Accident:	\$1,000,000
or	
Combined Single Limit (Bodily Injury and Property Damage)	\$1,000,000

“

SC-57. 5.04 B.1. – Add the following to the end of this subparagraph:

“The following are to be listed as additional insured on all insurance policies:

Brazos River Authority
Legal name of consultant
Legal name of subconsultant (If applicable)”

SC-58. 5.04 B. – Add the following subparagraph after 5.04 B.1.:

“1a. waive subrogation rights for loss or damage to the extent same are covered by insurance. Insurers shall not have the right to recovery or subrogation against OWNER or ENGINEER, it being the intention that the insurance policies shall protect all parties to the Contract and be primary coverage for all losses covered by the policies;”

SC-59. 5.06 B. – Delete this paragraph in its entirety and replace with the following:

“B. CONTRACTOR shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER’s Consultants and any other persons or entities identified in these Supplementary Conditions, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.”

SC-60. 5.06 D. – Delete this paragraph in its entirety and replace with the following:

“D. OWNER shall not be responsible for purchasing and maintaining any insurance to protect the interest of the CONTRACTOR, Subcontractors, or others in the Work. The stated limits of insurance required are minimum only. CONTRACTOR shall determine the limits that are adequate. These limits may be basic policy limits or any combination of basic limits and umbrella limits. In any event, CONTRACTOR is fully responsible for all losses arising out of, resulting from or connected with operations under this Contract whether or not said losses are covered by insurance. The acceptance of certificates or other evidence of insurance by the OWNER, ENGINEER, and/or others listed as additional insured in these Supplementary Conditions that in any respect do not comply with the Contract requirements does not release the CONTRACTOR from compliance herewith.”

SC-61. 5.06 E. – Delete this paragraph in its entirety.

SC-62. 5.07 – Delete this paragraph in its entirety

SC-63. 6.01 B. – Delete the first sentence this paragraph and replace with the following:

“At all times during the progress of the Work, CONTRACTOR shall assign a competent resident superintendent, approved by the OWNER in writing. The resident superintendent shall not be replaced without written authorization by the OWNER and ENGINEER.”

SC-64. 6.02 B. – Delete this paragraph in its entirety.

SC-65. 6.03 A. – In the first sentence, delete “Unless otherwise specified in the General Requirements”.

SC-66. 6.04 A.1. – In the second sentence, delete “General Requirements” and replace with “Specifications”.

SC-67. 6.05 A. – Delete the last sentence in this paragraph and replace with the following:

“Unless the specification or description contains or is followed by words reading that no like, equivalent, or “or-equal” item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers shall be submitted to ENGINEER for review. Prior to making any final recommendations and/or determinations the ENGINEER shall submit the information to the OWNER for comment. Request for modifications shall only be submitted under the circumstances described below.”

SC-68. 6.05 A.1.b.(ii) – Delete “substantially, even with deviations,”.

SC-69. 6.05 A.2.c. – Delete “, as supplemented in the General Requirements and as ENGINEER may decide is appropriate under the circumstances”.

SC-70. 6.05 A.2.d. – Delete the fourth sentence and replace with the following:

“All variations, including but not limited to those impacting performance, operation, maintenance, and service life of the proposed substitute item from that specified will be identified in the application, and available engineering, sales, maintenance, repair, and replacement services will be indicated.”

SC-71. 6.05 A. – Add the following two subparagraphs after subparagraph 2:

“3. Engineering required for “or –equal” or substitute items: Any redesign required as a result of proposed “or –equal” or substitute items shall be prepared by the ENGINEER.

4. Costs and time associated with “or –equal” or substitute items: Any and all additional costs (including but not limited to: mechanical, architectural, structural, electrical, and engineering redesign costs etc.) associated with an “or-equal” item and/or substitute item shall be paid by CONTRACTOR. In addition, costs of all paid-up licenses necessary for the use of the equipment if required by the manufacturer shall be paid by CONTRACTOR. Any redesign performed by the ENGINEER shall be paid for by CONTRACTOR. Cost for engineering effort will be billed to the OWNER by the ENGINEER for the actual hours required for the review, redesign, and/or any other engineering services required as a result of the “or –equal” or substitute items in accordance with the rates and fees established in the OWNER’s contract with the ENGINEER. Any engineering costs billed to the OWNER, as contemplated herein, shall be deducted from the Contract Price and recorded in a Change Order. The CONTRACTOR agrees that delays caused by redesign and reviews necessary for “or –equal” or substitute items shall not constitute grounds for a claim or extension of Contract Times.”

SC-72. 6.05 C. – Delete the third sentence and replace it with the following:

“No “or-equal” or substitute items, and/or substitute construction method or procedure will be ordered, installed or utilized until ENGINEER’s review is complete, which will be evidenced by a Change Order.”

SC-73. 6.05 D. – Delete the last word in this paragraph and replace with ““or-equal”, substitute, and/or any substitute construction method or procedure proposed or submitted by CONTRACTOR”.

SC-74. 6.05 E. – Delete this paragraph in its entirety and replace with the following:

“ENGINEER’s Cost Reimbursement: ENGINEER will record time required by ENGINEER and ENGINEER’s Consultants in evaluating “or-equal”, substitute, and/or any substitute construction method or procedure proposed or submitted by CONTRACTOR and in making changes in the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) occasioned thereby. Whether or not ENGINEER approves an “or-equal”, substitute, and/or any substitute construction method or procedure proposed or submitted by

CONTRACTOR, the charges of ENGINEER and ENGINEER's Consultants for evaluating each such proposed substitute shall be deducted from the Contract Price and recorded in a Change Order. In the event deductions from the Contract Price are not sufficient to pay ENGINEER's charges, CONTRACTOR shall be liable for such excess costs."

SC-75. 6.05 F. – Delete "substitute or "or-equal"" and replace with ""or-equal", substitute, and/or any substitute construction method or procedure proposed or submitted by CONTRACTOR".

SC-76. 6.05 – Add the following paragraph after paragraph 6.05 F.:

"G. Allowance of "or-equal" and/or substitute items does not constitute a waiver of the Specifications."

SC-77. 6.06 A. – At the end of the last sentence, add ", unless called for in the Contract Documents."

SC-78. 6.06 B. – Amend this paragraph by replacing the words "Supplementary Conditions" wherever they occur with the words "Contract Documents".

SC-79. 6.06 – Add the following paragraphs after paragraph 6.06 G.:

"H. OWNER may furnish to any such Subcontractor, Supplier, or other person or organization, to the extent practicable, information about amounts paid to CONTRACTOR in accordance with CONTRACTOR's Application for Payment on account of the particular Subcontractor's, Supplier's, other person's or other organization's Work.

I. CONTRACTOR shall furnish OWNER the names and contact information for all Subcontractors, Suppliers, and any other individual or entity utilized by CONTRACTOR on the Project, at the time such Subcontractors, Suppliers, and other individual or entity are utilized by CONTRACTOR, on an ongoing basis throughout the Project. Further, CONTRACTOR shall provide OWNER a complete list of all Subcontractors, Suppliers, and other individuals or entities utilized by CONTRACTOR on the Project prior to Final Completion of the Project."

SC-80. 6.09 A. – In the second sentence delete "Except where otherwise expressly required by applicable Laws and Regulation,"

SC-81. 6.09 B. – In the first sentence, delete "knowing or having reason to know that it" and replace with "that".

SC-82. 6.09 C. – Delete the first sentence and replace with the following:

"Unforeseeable changes in Laws or Regulations on or after the opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work may be the subject of an adjustment in Contract Price or Contract Times. However, regardless of whether changes in Laws or Regulations are foreseeable, unforeseeable, have an effect on cost or time, or do not have an effect on cost or time, the CONTRACTOR shall be responsible for ensuring the Work is in compliance with such Laws and Regulations."

- SC-83.** 6.09 – Add the following paragraphs after paragraph 6.09 C. (definitions included in this paragraph 6.09 D. pertain only to this paragraph 6.09 D., which is included verbatim as a statutory requirement of the State of Texas):

“D. Workers' Compensation Insurance Coverage.

1. *Definitions:*

a. Certificate of coverage ("certificate")- A copy of a certificate of insurance, a certificate of authority to self-insure issued by the division, or a coverage agreement (DWC Form-81, DWC Form-82, DWC Form-83, or DWC Form- 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 §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 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.

2. 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 requirements of Texas Labor Code, Section 401.011(44) for all employees of the CONTRACTOR providing services on the project, for the duration of the project.

3. The CONTRACTOR must provide a certificate of coverage to the governmental entity prior to being awarded the contract.

4. 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 governmental entity showing that coverage has been extended.

5. The CONTRACTOR shall obtain from each person providing services on a project, and provide to the governmental entity:

a. 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

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.

6. The CONTRACTOR shall retain all required certificates of coverage for the duration of the project and for one year thereafter.

7. The CONTRACTOR shall notify the governmental entity 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.
8. The CONTRACTOR shall post on each project site a notice, in the text, form and manner prescribed by the Texas *Department of Insurance, Division of Workers' Compensation*, informing all persons providing services on the project that they are required to be covered, and stating how a person may verify coverage and report lack of coverage.
9. The CONTRACTOR shall contractually require each person with whom it contracts to provide services 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, Section 401.011(44) for all of 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:
 - i. A certificate of coverage, prior to the other person beginning work on the project; and
 - ii. A new certificate of coverage showing extension of coverage, 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 governmental entity in writing by certified mail or personal delivery, within 10 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
 - g. Contractually require each person with whom it contracts to perform as required by paragraphs a. – g., with the certificates of coverage to be provided to the person for whom they are providing services.
10. 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-insured, with the *division*. Providing false or misleading information may subject the CONTRACTOR to administrative penalties, criminal penalties, civil penalties, or other civil actions.

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

E. *Prohibition on Boycotting Israel*: CONTRACTOR hereby verifies that CONTRACTOR:

1. Does not boycott Israel; and
2. Will not boycott Israel during the term of this Contract."

SC-84. 6.10 A. – Add the following language to the end of the paragraph:

"The OWNER qualifies as an exempt agency as defined by the statutes of the State of Texas. The CONTRACTOR shall comply with all applicable Laws and Regulations."

SC-85. 6.11 A.2. – Delete "or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law".

SC-86. 6.11 A.3. – Delete "ENGINEER's Consultant".

SC-87. 6.11 C. – In the first sentence, after "Prior to Substantial Completion of the Work", add "and again prior to Final Completion,".

SC-88. 6.12 A. – Amend the first sentence as follows:

After "CONTRACTOR shall maintain in a safe place at the Site", add ", and readily available to OWNER and ENGINEER,".

Delete "Work Change Directives,".

SC-89. 6.13 B. – Amend as follows:

In the third sentence, delete "or ENGINEER's Consultant".

Delete the last sentence and replace with "CONTRACTOR's duties and responsibilities for safety and for protection of the Work shall continue until Final Completion."

SC-90. 6.15 A. – Add the following sentence to the end of this paragraph: "In addition, CONTRACTOR shall maintain the material safety data sheets or other hazard communication information on Site and readily available."

SC-91. 6.16 A. – In the last sentence, delete "Work Change Directive or".

SC-92. 6.17 A. – In the second sentence, delete "General Requirements" and replace with "Specifications".

SC-93. 6.17 D.2. – Delete this paragraph in its entirety and replace with the following:

"All Shop Drawings shall be in strict compliance with the Contract Documents. The CONTRACTOR may seek deviations by submitting a PCM, which must be approved by Written Amendment, Change Order or Field Order which shall be attached to the Shop Drawings."

SC-94. 6.17 E.3 – Amend this subparagraph as follows:

Delete "unless CONTRACTOR has in writing called ENGINEER's attention to each such variation at the time of each submittal as required by paragraph 6.17D.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 approval”.

- SC-95.** 6.17 F. – Delete the last sentence in this paragraph, and replace with the following:

“All resubmittals shall be in strict compliance with the Drawings, Specifications and Contract Documents, and the only changes permitted from the prior submittal shall be modifications or additional information addressing specifically the ENGINEER’s previous comments.”

- SC-96.** 6.18 – Amend this subparagraph as follows:

In the second sentence, delete “or as OWNER and CONTRACTOR may otherwise agree in writing”.

Add the following sentence to the end of the paragraph: “CONTRACTOR assumes and bears responsibility for all costs and time delays associated with any variation from the requirements of the Contract Documents.”

- SC-97.** 6.19 A.2. – Delete “under normal usage” and replace with “occurring after Final Completion”.

- SC-98.** 6.20 A. – In the first paragraph, after “CONTRACTOR SHALL INDEMNIFY” add “, DEFEND” and delete “ENGINEER’S CONSULTANTS,”.

- SC-99.** 6.20 C. – Delete this paragraph in its entirety and replace with the following:

“THE INDEMNIFICATION OBLIGATIONS OF CONTRACTOR UNDER PARAGRAPH 6.20.A. SHALL NOT EXTEND TO THE LIABILITY OF ENGINEER AND/OR ENGINEER’S OFFICERS, DIRECTORS, PARTNERS, EMPLOYEES, AGENTS, AND OTHER CONSULTANTS AND SUBCONTRACTORS OF ENGINEER, TO THE EXTENT SUCH LIABILITY DIRECTLY RESULTS FROM ENGINEER’S AND/OR ENGINEER’S OFFICERS, DIRECTORS, PARTNERS, EMPLOYEES, AGENTS, AND OTHER CONSULTANTS AND/OR SUBCONTRACTORS GROSS NEGLIGENCE OR WILLFUL MISCONDUCT.”

- SC-100.** Immediately after paragraph 6.20, add a new paragraph to read as follows:

“6.21 Transportation, Delivery, Storage and Protection

A. This Section specifies the general requirements for the delivery handling, storage and protection for all items required in the construction of the Work. Specific requirements, if any, are specified with the related item.

B. CONTRACTOR shall transport and handle items in accordance with manufacturer’s instructions. All items shall be delivered to the site in undamaged condition, in manufacturer’s original sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting and installing. All items delivered to the site shall be unloaded and placed in a manner which will not hamper the CONTRACTOR’s normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic. CONTRACTOR shall provide necessary equipment and personnel to unload all items delivered to the site. CONTRACTOR shall promptly inspect shipment to assure that products comply with requirements, quantities are correct and items are undamaged. For items furnished by others (i.e. OWNER, other contractors), perform inspection in the presence of the ENGINEER. Notify ENGINEER verbally, and in writing, of any problems.

C. CONTRACTOR shall store and protect products in accordance with the manufacturer’s instructions, with seals and labels intact and legible. Storage instruction shall be studied by the CONTRACTOR and reviewed with the ENGINEER by him/her. Instruction shall

be carefully followed and a written record of this kept by the CONTRACTOR. CONTRACTOR shall arrange storage to permit access for inspection.”

SC-101. Immediately after paragraph 6.21, add a new paragraph to read as follows:

“6.22 Salvage of Equipment and Materials

A. Existing equipment and materials removed and not shown or specified to be reused in the Work will become CONTRACTOR’s property unless otherwise noted. The OWNER has right of first refusal for items to be salvaged by the CONTRACTOR and not denoted to be salvaged.

B. Existing equipment and materials removed by CONTRACTOR shall not be reused in the Work, except where so specified or indicated.

C. CONTRACTOR shall carefully remove equipment and materials specified or indicated to be salvaged and reused or to remain property of OWNER in a manner to prevent damage to all such equipment and materials. CONTRACTOR shall store and protect salvaged items specified or indicated to be used in the Work. CONTRACTOR shall replace in kind or with new items equipment, materials, and components damaged in removal, storage, or handling through carelessness or improper procedures.

D. CONTRACTOR may furnish and install new items, with ENGINEER’s approval as otherwise provided in this Contract, instead of those specified or indicated to be salvaged and reused, in which case such removed items will become CONTRACTOR’s property.”

SC-102. 7.01 – Amend the title of this paragraph to *“Related Work and/or Other Work at Site”*.

SC-103. 7.01 A. – Delete this paragraph and its subparagraphs in their entirety and replace with the following:

“OWNER may perform other work, related to the Project or otherwise, at the Site by OWNER’s employees, or let other direct contracts therefor, or have other work performed by utility owners.

The following work is being performed at the Project Site in addition to the Work being performed by CONTRACTOR:

1. *Work Not Related to the Project:* Reinforced Concrete Components; BRA Dam Maintenance Projects.

SC-104. 7.01 – Add the following paragraph after paragraph 7.01 A.:

“A-1. In addition to the work listed in paragraph 7.01 A., OWNER may from time to time initiate other work, related to the Project or otherwise, at the Site. If OWNER initiates other work at the Site, then: written notice thereof, including relevant information regarding the other work, will be given to CONTRACTOR prior to starting any such other work. In the event CONTRACTOR determines such other work requires an adjustment in the Contract Price or Contract Times, CONTRACTOR shall provide written notice of such intent to OWNER and ENGINEER within ten (10) days from receipt of OWNER’s notice. CONTRACTOR’s notification shall include: (i) a clear description of how and to what extent the other work will affect CONTRACTOR’s Work; and (ii) supporting documentation and/or other evidence supporting CONTRACTOR’s request for such adjustment. After receipt of CONTRACTOR’s notice, ENGINEER will promptly review, determine the necessity of OWNER’s obtaining additional information from CONTRACTOR with respect thereto, and advise OWNER in writing (with a copy to CONTRACTOR) of ENGINEER’s findings and conclusions. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should

be allowed as a result of such other work, a Claim may be made therefor as provided in paragraph 10.05. Notwithstanding the foregoing, CONTRACTOR shall not be entitled to any adjustment in the Contract Price or Contract Times if CONTRACTOR failed to give the written notice within the ten (10) day notice period as required herein."

- SC-105.** 7.01 B. – In the second sentence, after "Unless otherwise provided in the Contract Documents," insert "if such other work is related to the Project,"
- SC-106.** 7.01 C. – In the first sentence, after "and promptly report to ENGINEER" insert "and OWNER"; in the last sentence, after "CONTRACTOR's failure to so report will constitute" replace "an" with "CONTRACTOR's".
- SC-107.** 7.02 A. – Delete "following will be set forth in Supplementary Conditions" and replace with "OWNER shall provide the information to the CONTRACTOR".
- SC-108.** 7.02 A.2. – Delete "will be itemized" and replace with "in an itemized list".
- SC-109.** 8.02 A. – Delete "to whom CONTRACTOR makes no reasonable objection".
- SC-110.** 8.04 A. – Delete "14.02.C and 14.07.C" and replace with "14.02 and 14.07".
- SC-111.** 8.07 A. – Delete "execute" and replace with "evaluate".
- SC-112.** 8.09 A. – In the second sentence, delete "will" and replace with "shall".
- SC-113.** Add the following paragraph after paragraph 8.09 A."

"B. OWNER may, but shall not be required to, notify CONTRACTOR and/or ENGINEER of any issues or concerns the OWNER may have regarding CONTRACTOR's quality control on the Project. Failure or forbearance to report to or otherwise notify CONTRACTOR and/or ENGINEER of such issues or concerns shall not constitute an OWNER default under the Contract Documents, a waiver of the right of OWNER to enforce any provisions of the Contract Documents associated with such issues or concerns, or relieve CONTRACTOR of any obligations under the Contract Documents associated with such issues or concerns. Neither shall such failure or forbearance constitute acceptance of the Work.

- SC-114.** 9.02 A. – Delete the second, third, fourth, and fifth sentences in their entirety.
- SC-115.** 9.03 –
Delete this paragraph in its entirety, and insert the following in its place:

"A. The ENGINEER will have a Resident Project Representative on the Site. The duties, responsibilities and the limitations of authority of the Resident Project Representative, and designated assistants, are as follows:

1. Resident Project Representative is ENGINEER's agent at the site, will act as directed by and under the supervision of ENGINEER, and will confer with ENGINEER regarding Resident Project Representative's actions. Resident Project Representative's dealings in matters pertaining to the on-site Work shall, in general, be with ENGINEER and CONTRACTOR, while keeping OWNER fully advised.

B. Duties and Responsibilities of the Resident Project Representative:

1. Schedules: Review the progress schedule, schedule of Shop Drawing submittals and schedules of values prepared by CONTRACTOR and consult with ENGINEER concerning acceptability.

2. Conference and Meetings: Attend meetings with CONTRACTOR, such as preconstruction conferences, progress meetings, job conferences and other project-related meetings, and prepare and circulate copies of minutes thereof.
3. Communication:
 - a. The RPR shall facilitate communication between the CONTRACTOR, ENGINEER, and OWNER, to promote the successful and timely completion of the Work.
 - b. RPR will coordinate with OWNER and CONTRACTOR, when CONTRACTOR's operations affect OWNER's on-site operations.
 - c. Assist in obtaining from OWNER additional details or information, when required for proper execution of the Work.
4. Shop Drawings and Samples:
 - a. Record date of receipt of Shop Drawings and Samples.
 - b. Receive Samples which are furnished at the Site by CONTRACTOR, and notify ENGINEER of availability of Samples for examination.
 - c. Advise ENGINEER and CONTRACTOR of the commencement of any Work requiring a Shop Drawing or Sample if the submittal has not been approved by ENGINEER.
 - d. Reject delivery of equipment, materials and supplies for which there is no approved Shop Drawing, Sample or Submittal.
5. Review of Work, Rejection of Defective Work, Inspections and Tests:
 - a. Conduct on-site observations of the Work in progress to determine if the Work is proceeding in accordance with the Contract Documents.
 - b. Report to ENGINEER whenever Resident Project Representative believes that any Work will not produce a completed Project that conforms to the Contract Documents or will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made, and advise ENGINEER of Work the Resident Project Representative believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.
 - c. Verify that tests, equipment and systems start-up and operating and maintenance training are conducted in the presence of appropriate personnel, and the CONTRACTOR maintains adequate records thereof, and observe record and report to ENGINEER appropriate details relative to the test procedures and start-ups.
 - d. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Project, record the results of these inspections and report to ENGINEER.
6. Report on ENGINEER's Interpretation of Contract Documents. Report to ENGINEER when clarifications and interpretations of the Contract Documents are needed then transmit to CONTRACTOR clarifications and interpretations as issued by ENGINEER.

7. Records.

a. Maintain at the job site orderly files for correspondence, reports of job conferences, Shop Drawings and Samples, reproductions of original Contract Documents, including all Addenda, Change Order, Field Orders, Written Amendments, additional Drawings issued subsequent to the execution of the Contract, ENGINEER'S clarifications and interpretations of the Contract Documents, progress reports, submittals and correspondence received from and delivered to CONTRACTOR and other Project related documents.

8. Reports:

a. Furnish to ENGINEER periodic reports as required of progress of the Work and of CONTRACTOR's compliance with the progress schedule and schedule of Shop Drawings and Sample submittals.

b. Consult with ENGINEER in advance of scheduled tests, inspections or start of each phase of the Work.

c. Draft proposed Change Orders and Field Orders, obtaining backup material from CONTRACTOR, and recommend to ENGINEER, Change Orders and Field Orders.

d. Report immediately to ENGINEER and OWNER the occurrence of any accident.

9. Payment Requests: Review Applications for Payment with CONTRACTOR for compliance with the established procedure for their submission and forward with recommendations to OWNER, noting particularly the relationship of the payment requested to the schedule of values, Work completed and materials and equipment at the Site but not incorporated in the Work.

10. Certificates, Maintenance and Operation Manuals: During the course of the Work, verify that certificates, maintenance and operation manuals and other data required to be assembled and furnished by CONTRACTOR are applicable to the items actually installed and in accordance with the Contract Documents, and have this material delivered to ENGINEER for review and forwarding to OWNER prior to final payment for the Work.

11. Completion:

a. Before ENGINEER issues a Certificate of Substantial Completion, submit to CONTRACTOR a list of observed items still requiring completion or correction.

b. Observe whether CONTRACTOR has performed all applicable inspections.

c. Conduct a final inspection in the company of ENGINEER, OWNER and CONTRACTOR and prepare a final list of items to be completed or corrected.

d. Observe whether all items on final list have been completed or corrected and make recommendations to ENGINEER concerning acceptance.

C. Limitations of Authority of Resident Project Representative.

1. Shall not authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items), unless authorized by Field Order or Change Order.

2. Shall not exceed limitations of ENGINEER's authority as set forth in Agreement or the

Contract Documents.

3. Shall not undertake any of the responsibilities of CONTRACTOR, Subcontractor, Suppliers, or CONTRACTOR's superintendent.
4. Shall not advise on, issue directions relative to or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction unless such advice or directions are specifically required by the Contract Documents.
5. Shall not advise on, issue directions regarding or assume control over safety precautions and programs in connection with the Work or any activities or operations of OWNER or CONTRACTOR.
6. Shall not accept shop drawing or sample submittals from anyone other than the CONTRACTOR.
7. Shall not actively participate in specialized field or laboratory tests or inspections conducted by others except as specifically authorized by ENGINEER.
8. RPR's duties, activities, presence and participation in the Work shall in no way constitute a guarantee or warranty of the quality of the Work, nor shall it constitute acceptance of the Work.

SC-116. 9.04 A. – In the second sentence, delete “OWNER and”. Delete the last sentence.

SC-117. 9.05 A. – Delete this paragraph in its entirety and replace with the following:

“ENGINEER may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve any of the following: changes in Drawings and Specifications necessary after the performance of the Work has commenced; changes which increase and/or decrease the Contract Price and/or Cost of Work; changes which increase or decrease Contract Times; changes which impact the anticipated service life of the Work; and/or changes that significantly impact operation and maintenance and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These authorized variations shall be accomplished by a Field Order and will be binding on OWNER and also on CONTRACTOR, who shall perform the Work involved promptly.”

SC-118. 9.09 B. In the first sentence, delete “in good faith in such capacity” and replace with “using, at a minimum, the standard of ordinary care, skill and diligence of a licensed Professional Engineer in the State of Texas.”

SC-119. 9.10 D. In the first sentence, replace the word “final” with “Final”.

SC-120. 10.01 A. – In the first sentence, after “Written Amendment” delete the comma, insert “or”, and delete “, or a Work Change Directive”.

SC-121. 10.01 B. – Delete “Work Change Directive” and replace with “change in the Work”.

SC-122. 10.03 A.2. – Delete this subparagraph in its entirety and replace with the following:

“changes in Drawings and Specifications necessary after the performance of the Work as commenced; changes which increase and/or decrease the Contract Price and/or Cost of Work; changes which increase or decrease Contract Times; changes which impact the anticipated service life of the Work; and/or changes that significantly impact operation and maintenance which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed; and”

SC-123. 10.03 A.3. – Delete “the Contract Price or Contract Times” and replace with the following:

“Drawings and Specifications necessary after the performance of the Work as commenced; changes which increase and/or decrease the Contract Price and/or Cost of Work; changes which increase or decrease Contract Times; changes which impact the anticipated service life of the Work; and/or changes that significantly impact operation and maintenance”.

SC-124. 10.05 A. – In the first sentence, after “(but in no event later than 30 days” insert “from the date the claimant knew or should have known of the circumstance(s) giving rise to such Claim, dispute, or other matter” and delete “start of the event giving rise thereto”.

SC-125. 10.05 B.2. – Delete “Substantial Completion” and replace with “Final Completion”.

SC-126. 11.01 A. – Amend this paragraph as follows:

In the second sentence, delete “required” and replace with “actually incurred”.

Delete the last sentence and replace with the following:

“Except as otherwise may be agreed to in writing by OWNER, the Cost of the Work shall: 1) be in amounts no higher than those paid for the Work included in the Contract Price; 2) not include any of the costs itemized in paragraph 11.01 B; and 3) shall include only the following items:”

SC-127. 11.01 A.1. – Amend this paragraph as follows:

In the second sentence, delete “without limitation superintendents, foreman” and replace with “one foreman (unless agreed upon prior to beginning Work)”.

Delete the last sentence and replace with the following:

“The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall not exceed 1.5 times regular pay and shall be included in the above to the extent authorized by OWNER. CONTRACTOR shall provide certified payroll records listing personnel classifications and salaries for all individuals involved in additional Work. Salaries for those not included in the certified payroll will be considered as being compensated under paragraph 11.01 B.”

SC-128. 11.01 A.2. – In the first sentence, after “in connection therewith” insert “, supported by invoices and receipts”.

SC-129. 11.01 A.3. – Add the following sentence to the end of this subparagraph:

“CONTRACTOR shall ensure that Subcontractors provide certified payroll records listing personnel classifications and salaries for all individuals involved in additional Work. Salaries for those not included in the certified payroll will be considered as being compensated in the same manner as described in paragraph 11.01 B.”

SC-130. 11.01 A.4. – After “testing laboratories,” insert “and” and delete “, attorneys, and accountants”.

SC-131. 11.01 B.1. – Delete “superintendents”.

SC-132. 11.01 D. – After “and submit in a form” insert “and at intervals”.

SC-133. 11.03 A. At the end of the first sentence delete “Agreement” and replace with “Contract Documents”.

SC-134. 11.03 C. – Delete this paragraph and its subparagraphs in their entirety and replace with the

following:

“A. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment in accordance with paragraph 10.05 under the following conditions:

1. If the total cost of a particular item of Unit Price Work amounts to twenty percent (20%) or more of the Contract Price at time of contract award and the variation in the quantity of that particular item of Unit Price Work performed by the CONTRACTOR differs by more than twenty percent (20%) from the estimated quantity of such item indicated in the Contract Documents; and
2. If there is not corresponding adjustments with respect to any other item of Work; and
3. If CONTRACTOR believes that CONTRACTOR has incurred additional expense as a result thereof or if OWNER believes that the quantity variation entitles OWNER to an adjustment in the Unit Price, either the OWNER or CONTRACTOR may make a claim for an adjustment in the Contract Price in accordance with Article 11.01 if the parties are unable to agree as to the effect of any such variation in the quantity of the Unit Price Work performed.”

SC-135. Immediately after paragraph 11.03, add a new paragraph to read as follows:

“11.04 *No Claims for Delay in Performance*

A. The CONTRACTOR agrees to make no claims for damage for delay in the performance of the Contract occasioned by any act or omission to act of the OWNER, ENGINEER, or any of the ENGINEER’s or OWNER’s agents, and agrees that any such claim shall be fully compensated by an extension of time, so set forth in a Change Order, to complete performance of the Work as provided herein, and such extension of time shall be CONTRACTOR’s sole remedy for any such claim.”

SC-136. 12.01 C.2.e. – Delete “five” and replace with “fifteen” and insert the following at the end of this subparagraph after “net decrease”:

“for costs incurred under paragraphs 11.01.A.1 and 11.01.A.2 or a deduction in CONTRACTOR’s fee by an amount equal to five percent of such net decrease for costs incurred under paragraph 11.01.A.3”

SC-137. 12.03 A. – At the end of this paragraph add the following sentence:

“No time extensions will be allowed for weather conditions.”

SC-138. 12.06 A.1. – At the end of this subparagraph, insert “, any Subcontractor, or any Supplier”.

SC-139. 12.06 A.2 – After “acts of God,” insert “court orders, actions by regulatory bodies,”.

SC-140. 12.06 B. – Delete “or inactions”.

SC-141. 13.04 A. – After “written request of ENGINEER,” insert “or contrary to the requirements of the Contract Documents,”.

SC-142. 13.07 – Retitle this section “Warranty Period”

SC-143. 13.07 A. – Delete this paragraph in its entirety and replace with the following:

“The warranty period for all Work on the Project shall be two years after the date of Final Completion or such longer period as may be prescribed by Laws or Regulations or by the terms

of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents or by any other applicable warranty. If within two years after the date of Final Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents or by any other applicable warranties, any Work is found to be defective, or if the repair of any damages to the land or areas made available for CONTRACTOR's use by OWNER or permitted by Laws and Regulations as contemplated in paragraph 6.11.A is found to be defective, or if any Work is subject to repair, replacement, remediation, or otherwise requires correction in accordance with the terms of any other applicable warranty, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER's written instructions: (i) repair such defective land or areas, or (ii) correct such defective Work or, if the defective Work has been rejected by OWNER, remove it from the Project and replace it with Work that is not defective, and (iii) satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom. If CONTRACTOR does not promptly comply with the terms of such 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, and 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 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) will be paid by CONTRACTOR."

SC-144. 13.07 B. – Delete this paragraph in its entirety.

SC-145. 13.07 C. – After "an additional period of one year" insert the following:

"beyond the original two-year warranty period, or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents or by any other applicable warranty,".

SC-146. 13.07 – Add the following paragraph after paragraph 13.07 D.:

"E. The warranty period process set forth under this paragraph 13.07, including, but not limited to, additional one-year extensions to the warranty period for defective work, shall continue until the expiration of any and all warranty periods and extensions."

SC-147. 13.08 A. – Add the following sentence to the end of this paragraph:

"In addition, CONTRACTOR shall provide warranties for such accepted defective work as determined appropriate by OWNER and ENGINEER. Warranties for non-defective portions of the Work shall continue to be provided by CONTRACTOR in accordance with the terms of the Contract Documents."

SC-148. 13.09 B. – Delete the first sentence of this paragraph.

SC-149. 14.01 A. – After the first sentence, add the following sentence:

"All mobilization cost limits, as set forth in the Bidding Documents, shall be included in the schedule of values established in paragraph 2.07.A and shall be strictly enforced by OWNER."

SC-150. 14.02 A.3 – Delete this subparagraph in its entirety and replace it with the following:

"The amount of retainage with respect to progress payments will be ten percent (10%) of the total amount of completed Work and properly stored materials on hand. This amount shall be retained

until Final Payment is tendered as set forth in Section 14.07. In addition to the amount retained above, the owner may retain additional amounts as set forth elsewhere in the Contract.”

SC-151. 14.02 B.1. – In the first sentence, between “10” and “days” insert “business”.

SC-152. 14.02 B.2.b. – Delete “quality of the”; Delete Substantial Completion” and replace with “Final Completion”; and delete “subsequent”.

SC-153. 14.02 B.5. – Add the following subparagraph after subparagraph 14.02 B.5.d.:

“e. previously paid for Work is found to be defective.”

SC-154. 14.02 C.1. – Delete “Ten” and replace with “Thirty”.

SC-155. 14.02 D.1. – Add the following subparagraphs after subparagraph 14.02 D.1.d.:

“d. OWNER has paid for work which has subsequently been found to be defective;

e. OWNER has been notified of failure to make payments to Subcontractors or Suppliers for labor;

f. CONTRACTOR fails to submit up-to-date record documents as required by paragraph 6.12;

g. CONTRACTOR fails to submit monthly progress schedule updates or revised schedules as requested by the OWNER, and if required, the report indicating the CONTRACTOR’s plan for bringing the Project back on schedule;

h. CONTRACTOR fails to provide Project photographs required by Specifications; or

i. OWNER has previously paid for Work that has been subsequently determined to be non-conforming and/or defective, such that the total amount paid for Work on the Project to date is no longer accurate.

SC-156. 14.02 D. – After paragraph 14.02 D.3. add the following paragraph:

“4. OWNER may withhold payment for liquidated damages from the pay request for time permanently lost on the schedule at the time the delay is recognized in the progress schedule.”

SC-157. 14.04 A. – Amend this paragraph as follows:

In the first sentence, after “ready for its intended use” insert “, with no known defects or pending Claim(s),”

After the fifth sentence, add the following sentence:

“The parties hereto, acknowledge the tentative list, referenced herein, is an attempt to capture deficiencies in the Work and remaining items to be performed; however, in no event shall this tentative list be considered to be a complete and/or exhaustive list of all items that must be performed prior to achieving Final Completion.”

Delete the following language at the end of this paragraph:

“At the time of delivery of the tentative certificate of Substantial Completion ENGINEER will deliver to OWNER and CONTRACTOR a written recommendation as to division of responsibilities pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees.

Unless OWNER and CONTRACTOR agree otherwise in writing and so inform ENGINEER in writing prior to ENGINEER's issuing the definitive certificate of Substantial Completion, ENGINEER's aforesaid recommendation will be binding on OWNER and CONTRACTOR until final payment."

SC-158. 14.04 A. – Amend this paragraph by replacing all references to "certificate of Substantial Completion" with "Certificate of Substantial Completion", and replace all references where the term "certificate" is not followed by "of Substantial Completion" with "Certificate of Substantial Completion".

SC-159. 14.06 A. – Delete this paragraph in its entirety and replace with the following:

"After Substantial Completion, when the CONTRACTOR believes all Work has been performed in accordance with the Contract Documents, the CONTRACTOR shall request a Final Inspection. The CONTRACTOR shall submit a written request to the ENGINEER to coordinate a date and time for Final Inspection. ENGINEER will notify CONTRACTOR and OWNER in writing of the date and time for the Final Inspection. The ENGINEER, CONTRACTOR and OWNER shall attend Final Inspection at the Project site. In the event the ENGINEER believes the Work is incomplete, non-conforming, unacceptable and/or defective after completion of the Final Inspection, the ENGINEER will promptly notify the CONTRACTOR in writing of any and all incomplete, non-conforming, unacceptable and/or defective Work, which CONTRACTOR shall correct. After the CONTRACTOR has addressed the issues identified by the ENGINEER, the CONTRACTOR shall request another Final Inspection. This process shall continue until the Work has been determined by the ENGINEER (in writing) to be completed in accordance with the Contract Documents, at which point the ENGINEER shall notify the CONTRACTOR and the CONTRACTOR may proceed to prepare the Final Application for Payment."

SC-160. 14.07 A.1. – Replace "final inspection" with "Final Inspection" and replace "application for final payment" with "Final Application for Payment".

SC-161. 14.07 A.2. – In the opening sentence, replace "final" with "Final".

SC-162. 14.07 A.2. – Delete 14.07 A.2.(iii) and replace with the following:

"(iii) complete and legally effective releases or waivers, from the CONTRACTOR, Subcontractors, and Suppliers (in a form satisfactory to OWNER) of all Liens and/or Lien rights in connection with the Work."

SC-163. 14.07 A.3. – Delete this subparagraph in its entirety and replace with the following:

"In lieu of the releases or waivers of Liens specified in paragraph 14.07.A.2 and if specifically agreed to by the OWNER in writing CONTRACTOR may furnish a Bond or other collateral satisfactory to OWNER to indemnify OWNER against any Lien."

SC-164. 14.07 B. – Delete the title of this paragraph and replace with "Review of Final Application for Payment and Final Completion".

SC-165. 14.07 B.1. – Delete the first two sentences and replace with the following:

"If, on the basis of ENGINEER's observation of the Work during construction, ENGINEER's 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 successfully completed in accordance with the Contract Documents and CONTRACTOR's other obligations under the Contract Documents have been fulfilled,

ENGINEER will, within fourteen days after receipt of the Final Application for Payment, indicate in writing ENGINEER's recommendation regarding payment and, if payment is recommended, present the Final Application for Payment to OWNER for payment. Once OWNER has accepted and executed the Final Application for Payment, ENGINEER shall give notice to OWNER and CONTRACTOR that the Work is acceptable subject to the provisions of paragraph 14.09, and shall issue to CONTRACTOR the Certificate of Final Completion."

SC-166. 14.07 C.1. – After "Thirty days after" delete "the presentation to OWNER of the Application for Payment and accompanying documentation" and insert "the ENGINEER issues the Certificate of Final Completion to the CONTRACTOR".

SC-167. 14.07 – Add the following paragraph after paragraph 14.07 C.:

"D. Final Completion and Warranties

1. Final Completion shall occur upon issuance of the Certificate of Final Completion. All warranties provided for in the Contract Documents shall commence upon Final Completion."

SC-168. 14.08 A. – Delete this paragraph in its entirety.

SC-169. 14.09 A.1. – Delete this paragraph in its entirety.

"a waiver of all Claims by OWNER against CONTRACTOR, except Claims arising: 1) from unsettled Liens; 2) from defective Work, 3) from failure to comply with the Contract Documents or the terms of any special guarantees specified therein; or 4) from CONTRACTOR's continuing obligations under the Contract Documents; and".

SC-170. 15.01 A. – Delete this paragraph in its entirety and replace with the following:

"At any time and without cause, OWNER may suspend the Work or any portion thereof by providing notice in writing to CONTRACTOR and ENGINEER which will fix the date on which Work will be resumed. CONTRACTOR shall resume the Work on the date so fixed. CONTRACTOR shall be allowed an adjustment in the Contract Price or an extension of the Contract Times, or both, but only to the extent the adjustment is directly attributable to any such suspension and reflective of actual costs and/or time incurred as a result of the suspension, but only if CONTRACTOR makes a Claim therefor as provided in paragraph 10.05."

SC-171. 15.02 A.1. – Delete "persistent".

SC-172. 15.02 A.4. – Delete "in any substantial way".

SC-173. 15.02 B. – In the first sentence, after "in paragraph 15.02.A occur, OWNER may," replace "after" with "by".

SC-174. 15.03 A. – Insert "and" after the semi-colon at the end of subparagraph 15.03 A.1.; replace the semi-colon at the end of subparagraph 15.03 A.2 with a period; and delete subparagraphs 15.03 A.3. and A.4. in their entirety.

SC-175. 15.04 A. – Delete this paragraph in its entirety and replace with the following:

"A. If, through no act or fault of CONTRACTOR, the Work is suspended for more than 180 consecutive days by OWNER or under an order of court or other public authority, or OWNER fails for 30 days to pay CONTRACTOR any sum finally determined to be due after any applicable reductions in payment have been determined in accordance with the provisions of paragraph 14.026(D), 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 15.03. In lieu of terminating the Contract and without prejudice to any other right or remedy, or OWNER has failed for 30 days to pay CONTRACTOR any sum determined to be due after any applicable reductions in payment have been determined in accordance with the provisions of paragraph 14.02(D) 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 15.04 are not intended to preclude CONTRACTOR from making a Claim under paragraph 10.05 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."

SC-176. 16.01 A. – Delete this paragraph in its entirety and replace with the following:

"A. Subject to the provisions of paragraphs 9.09 and 10.05, OWNER and CONTRACTOR agree to negotiate in good faith to resolve any disputes and may engage in non-binding mediation prior to exercising any other rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect to any dispute."

SC-177. 17.03 A. – At the beginning of this paragraph, insert "Except as provided in paragraph 11.04,".

SC-178. 17.05. – Delete this paragraph in its entirety and replace with the following:

"17.05 *Controlling Law and Venue*

A. This Contract is to be governed by the law of the State of Texas, and if legal action is necessary to enforce any part of the Contract Documents, exclusive venue will lie in McLennan County, Texas."

SC-179. Immediately after paragraph 17.05, add the following new paragraphs to read as follows:

"17.06 *Fixed Date Contracts*

A. All references and conditions for a "calendar day contract" in the Standard General Conditions and Supplementary Conditions shall apply for a "Fixed Date Contract." A "Fixed Date Contract" is one in which the calendar dates for reaching substantial completion and/or final completion are specified in lieu of identifying the actual calendar days involved."

17.07 *Prevailing Wage Rates*

A. Wage Rates. CONTRACTOR shall not pay less than the wage scale of the various classes of labor as shown on the prevailing wage schedule provided by OWNER. The specified wage rates are minimum rates only.

B. Notification to Workers. CONTRACTOR shall post the prevailing wage schedule in a place conspicuous to all workers on the Site and shall notify each worker, in writing, of the following as they commence Work: the worker's job classification, the established minimum wage rate requirement for that classification, as well as the worker's actual wage. When requested by OWNER, CONTRACTOR shall provide records and evidence of compliance with Texas Government Code, Chapter 2258.

C. Determination of Worker Classification. CONTRACTOR is responsible for determining the most appropriate wage for a particular skill in relation to similar skills or trades identified on the prevailing wage schedule.

D. Penalty for Violation. CONTRACTOR, or its Subcontractors, will be assessed a penalty of sixty dollars (\$60) for each worker employed for each day, or portion thereof, that the

worker is paid less than the wage rates stipulated in the prevailing wage schedule.

E. Complaints of Violations.

1. Investigation. Upon receipt of complaint, OWNER will conduct an investigation in accordance with the provisions of Texas Government Code, Chapter 2258, and make an initial determination as to whether good cause exists to believe that a violation occurred. Upon making a good cause finding, OWNER will notify in writing the CONTRACTOR or subcontractor and any affected worker of its initial determination and retain any amount due pending a final determination of the violation, such amounts being subtracted from successive progress payments pending a final decision on the violation.
2. No Extension of Time. If OWNER's determination proves valid that good cause existed to believe a violation had occurred, CONTRACTOR is not entitled to an extension of Contract Times for any delay arising from the investigation."



Brazos River Authority

RFB NO. 21-05-1219

De Cordova Bend Dam Low Flow Outlet Works Repair Project Specifications

June 2021



Gannett Fleming

3838 Central Avenue, Suite 1900

Phoenix, AZ 85012

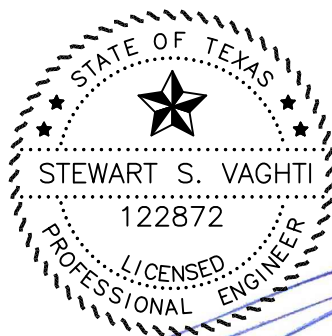
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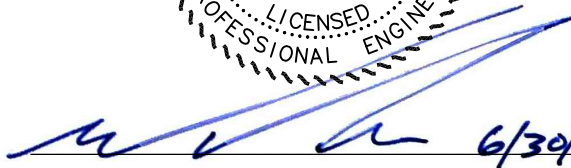
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 6/30/2021

Stewart S. Vaghti, P.E.

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Brian A. Seip, P.E.

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SECTION 01 00 00
GENERAL REQUIREMENTS

PART 1 GENERAL

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- A. Section Includes:
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- B. Related Sections:
 - 1. Section 01 32 00 – Construction Progress Documentation
 - 2. Section 01 40 00 – Quality Requirements

1.02 GENERAL

- A. The work to be performed under this contract shall consist of furnishing all plans, tools, equipment, materials, supplies, and manufactured articles and furnishing all labor, transportation, and services including the supply of fuel, power, water, and essential communications, and other agreed items and/or services as needed for the fulfillment of the contract in strict accordance with the Contract Documents.
- B. By submitting a bid for this Project, the CONTRACTOR hereby acknowledges and assures the OWNER that it has sufficient experience in constructing, installing, and testing of this type of work and therefor is familiar with all combinations of services, materials, labor and equipment that are required for the successful completion of this project. The work shall be complete, and all work, materials, and services not expressly indicated or called for in the Contract Documents, which may be necessary for the complete, safe and proper construction of the work in good faith, shall be provided by the CONTRACTOR at no increase in cost to the Project.
- C. The CONTRACTOR shall be responsible for determining the actual quantities of materials required for the work.
- D. Any item not included in the Contract but needed for completing the site Work under this Contract, including testing for satisfactory operation and commissioning, shall be supplied by the CONTRACTOR. The CONTRACTOR shall carefully review the Contract Drawings and Specifications to understand the Work involved

1.03 WORK INCLUDED

- A. Construct Work as described in the Contract Documents. The Work to be performed is described in general, non-inclusive terms and includes furnishing all labor, material, and equipment necessary to complete the Project.

1.04 PRODUCTS

- A. Provide materials and products per the individual sections of the Specifications.
- B. Provide security against vandalism and theft of all materials and products.

1.05 STANDARDS

- A. See Specification Section 01 41 00 – Regulatory Requirements.
- B. See Specification Section 01 40 00 – Quality Requirements, Article 1.06.B Regulatory Requirements and Reference Standards.

1.06 QUALITY

- A. The technical standards, Specifications and Drawings as detailed for the Project shall be maintained in their entirety and as a minimum for the total duration of the Project. All work performed by a subcontractor shall also be to the same technical standards, Specification, and Drawings as the CONTRACTOR. The CONTRACTOR shall be solely responsible to maintain cost and quality of Work performed, and adherence to the Project schedule to include their subcontractors. Work performed by the CONTRACTOR or any of their subcontractors that has been reviewed by the ENGINEER and found to be below the technical standards, Specifications or Drawings shall be removed and installed to the technical standards, Specifications, and Drawings for this Project and the cost shall be covered in its entirety by the CONTRACTOR.
- B. See also Specification Section 01 40 00 – Quality Requirements.

1.07 PROJECT SITE CONDITIONS AND SITE VISIT

- A. CONTRACTOR shall thoroughly familiarize itself with details of Work and working Site conditions before starting the Work. The ENGINEER will make arrangement for a site visit, if needed.
- B. Before performing each assigned Work item, CONTRACTOR shall verify all information in the field pertaining to the Work and submit a letter to the ENGINEER describing any conflicts or condition that may affect CONTRACTOR's Work. Claims for incorrect/incomplete information and/or differing site conditions will not be allowed unless this verification was performed, and the letter documentation can be provided by the CONTRACTOR.

1.08 USE OF PROJECT SITE

- A. The CONTRACTOR's use of the project site shall be limited to its construction operations, including on-site storage of materials, on-site fabrication facilities and field offices.

- B. The OWNER may utilize all or part of the existing site for the conduct of the OWNER's normal operations, and for other OWNER projects. CONTRACTOR shall cooperate and coordinate with the ENGINEER and OWNER to facilitate the OWNER's operations and projects and to minimize interference with the CONTRACTOR's operations at the same time. At any time, the OWNER shall be allowed safe access to the project site during the period of construction.
- C. At any time, the OWNER reserves the right to perform a site visit to any CONTRACTOR facilities to ensure progress is being made. CONTRACTOR facilities include, but are not limited to, CONTRACTOR's subcontractors and vendors facilities. These optional site visits will be at no additional cost to the Project from CONTRACTOR.

1.09 PROTECTION OF STRUCTURES AND UTILITIES

- A. Examine the Project site and review the available information concerning the site. Locate utilities, poles, piping, structures, and equipment. Verify the locations of the facilities within the work area. Report conflicting issues to the ENGINEER before beginning construction.
- B. Prepare a Plan of Action per the Contract Documents. Determine if structures, poles, piping, structures, equipment or other utilities within the work area will require relocation or replacement. Coordinate Work with OWNER, local utility company, and others. Include cost of demolition and replacement or relocation of these structures in the Bid.
- C. Protect structures not to be replaced or relocated from damage during construction. Structure or utilities damaged during or as a result of construction shall be restored to a condition matching or better than that which existed before the start of construction. Include cost of restoration or replacement in the price proposal (bid). Structures or utilities damaged during or as a result of any construction related activity shall be restored to a condition matching or better than that which existed before the start of construction at no additional cost to the Project.
- D. Protect buildings, structures, improvements, and equipment from damage when handling material or equipment. Protect finished surfaces, including floors, doors, and jambs. Remove doors and install temporary wood protective coverings over jambs.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

April 2021

Brazos River Authority
De Cordova Bend Dam

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 01 11 00
SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. General description of Project, location and Work to be performed.
- B. Related Sections:
 - 1. Section 35 22 26 – Slide Gates

1.02 SITE LOCATION

- A. Project location is De Cordova Bend Dam, Hood County, Texas.
- B. Exact location of Project is as indicated by the “Location Map”, “Vicinity Map”, and “Site Plan” on the Drawings.

1.03 WORK COVERED BY CONTRACT DOCUMENTS

- A. Construct Work as described in the Contract Documents. The Work to be performed is described in general, non-inclusive terms and includes furnishing all labor, material, equipment, and temporary work necessary to complete the following:
 - 1. Removal of two (2) 84”x96” cast iron slide gates (Gates #5 and #6) and replacement with two (2) new 84”x96” stainless-steel slide gates supplied by the OWNER.
 - 2. Removal of the existing hydraulic power unit (HPU), control panel and breather system and replacement with a new HPU, control panel, and breather system.
 - 3. Recoat existing gate thimbles and conduits for three (3) 48”x54” slide gates (Gates #1, #2 and #3) and one (1) 24”x24” slide gate (Gate #4).
 - 4. Replace the guide/seals for one (1) 48”x54” slide gate (Gate #3).
 - 5. Gate control programming, integration, startup, testing and training.
 - 6. Replace ladder center safety rail.
 - 7. Clean and treat (passivate) stainless steel.
 - 8. Closeout activities.
- B. Provide all materials, equipment, labor, tools, consumable supplies, spare parts, lubricants, incidentals and other materials required to make the Project completely operable.
- C. Provide all civil, structural, mechanical, electrical, instrumentation, and all other disciplines required for a complete and operable Project.
- D. Test and place the completed Project in operation.

- E. Drawings and Specifications do not indicate or describe all of the Work required to complete the Project. Additional details required for the correct installation of selected products are to be provided by the CONTRACTOR and coordinated with the ENGINEER.
- F. Provide all applicable documentation and information contemplated in the Contract Documents, including but not limited to, Operation and Maintenance Manuals, product information documentation, warranty documentation, and other applicable information related to the Work.
- G. Have the Manufacturer's representative present when the equipment is placed in operation.
 - 1. The representative is to be on site as often as necessary for proper and trouble-free operation.
 - 2. Ensure that the proper procedure is employed in start-up of systems.

1.04 WORK BY OWNER

- A. 84"x96" STAINLESS-STEEL SLIDE GATE FABRICATION:
 - 1. The following items are OWNER supplied and will be manufactured and/or delivered to the site by Hydro Gate, Inc. (Gate Manufacturer):
 - a. Two (2) new 84"x96" slide gates and frames, including UHMW seats/seals and fasteners.
 - b. Two (2) new 84"x96" Type "E" full-face insulating gasket sets.
 - 2. CONTRACTOR shall not include the price of the OWNER supplied slide gate items and delivery in their bid, however, CONTRACTOR is responsible for but not limited to the following:
 - a. Coordination with the Gate Manufacturer.
 - b. Coordination with all Work.
 - c. Submittals and coordination of submittals.
 - d. Offloading the OWNER supplied slide gate items from the delivery truck.
 - e. Storage and handling once delivered to the Site;
 - f. Hardware and incidental Work.
 - g. Installation, testing, and acceptance.
 - h. Quality Control.
 - i. Training.
 - 3. See also Specification Section 35 22 26 – Slide Gates.
- B. Remote Operator's Workstation HMI Programming.
 - 1. See also Construction Drawing I002, System Architecture.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

April 2021

Brazos River Authority
De Cordova Bend Dam

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 01 14 00
WORK RESTRICTIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. General procedures and requirements for work restrictions and outage requirements on Site.
 - 2. This Section is not intended to be inclusive of all timing, constraints, and considerations necessary and beneficial to perform the Work. The CONTRACTOR is required to fully study and analyze the Work, the Site, Technical Standards, and the schedule and technical requirements, and to develop detailed sequencing and specific means and methods to perform the Work in accordance with the requirements of these Contract Documents and within the required schedule.

1.02 CONTRACTOR'S USE OF SITE AND ACCESS TO SITE

- A. CONTRACTOR shall comply with any and all instructions, conditions, rules, or other directives that may be provided by OWNER from time to time regarding use of the Site and access to the Site. OWNER will provide direction regarding use of the Site and access to the Site at the preconstruction meeting but reserves the right to modify any such direction at any time.

1.03 WORK RESTRICTIONS AND CONSTRAINTS

- A. General Work Restrictions:
 - 1. Except as provided elsewhere in the Contract Documents, or permitted by the OWNER in writing, the CONTRACTOR shall not access any Project areas not requiring access for CONTRACTOR's Work.
 - 2. The CONTRACTOR shall limit its Work activities to the project area/limits shown on the Drawings.
 - 3. The CONTRACTOR shall not access private land without the express written permission of the private landowner.
 - 4. Additional restricted areas may be defined from time to time by the OWNER.
- B. De Cordova Bend Dam:
 - 1. De Cordova Bend Dam an active dam site. Work restrictions and constraints include any and all dam safety and operational functions required by the OWNER and/or Texas Commission on Environmental Quality (TCEQ).
 - 2. The OWNER will not lower the reservoir pool elevation to accommodate any Work.
 - 3. Reservoir pool and tailwater elevations are not guaranteed and are subject to hydrologic conditions, hydraulic conditions and/or dam operations.

4. The CONTRACTOR shall not stage or operate within the stilling basin without prior written approval from the OWNER.
5. Temporary staging on the bridge deck must be coordinated with and approved in writing by the ENGINEER in advance.
6. The CONTRACTOR must accommodate scheduled access across the bridge deck by the OWNER.
7. The CONTRACTOR shall immediately accommodate any emergency and/or dam safety related activities and conditions.

1.04 OUTAGE REQUIREMENTS

- A. Outage request. CONTRACTOR shall submit to the ENGINEER an Outage Request at least 14 calendar days in advance of any disruptions that may affect normal operation of the facility which shall include, but is not limited to the following:
 1. Area where Work will be performed.
 2. A detailed listing of all facility equipment that will be directly or indirectly affected by the outage.
 3. Outline procedures for accomplishing the Work including specific safety precautions to be taken, type and location of barricades, warning signs, and protective grounds and devices to be used.
 4. Commencement date and time of Work.
 5. Duration of Work.
 6. Number of personnel and their classification.
 7. Description of equipment to be used.
 8. Information indicating that the required materials are on site or data indicating shipping dates of materials not on site.
- B. Conditions:
 1. Schedule and coordinate outages with the ENGINEER and OWNER.
 2. No specific request for an outage will be considered unless the ENGINEER and OWNER have reasonable assurances that materials and equipment required for Work will be on site and CONTRACTOR will be prepared to perform Work on date and during period of time requested for specific outage. When Work cannot be performed during an approved outage period, notify the ENGINEER and OWNER that outage is not required.
 3. Show construction outages greater than 4 hours in the construction schedule.
 4. Work shall be coordinated with project operations. Outage scheduling will depend upon operating conditions. OWNER reserves right to schedule outages for any period during 24-hour day, any day of week. CONTRACTOR will be informed of type of outages available and restrictions prior to start of construction. CONTRACTOR's request for outages, scheduling of Work, delivery of materials on site, and submittal of drawings and data as required, will be governed by allowable time and outage periods available.
 5. Performance shall be in accordance with the facility's lock-out, tag-out procedures.

April 2021

Brazos River Authority
De Cordova Bend Dam

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 01 20 00
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: General procedures for price and payment of the Lump Sum Contract.

1.02 MEASUREMENT OF QUANTITIES

- A. Measure quantities in accordance with standard industry practice, and as specified herein. The ENGINEER will verify measurements on basis of completion of work in accordance with Contract Documents and stated hereinafter. Except for time, measure quantities to the nearest whole number of units. Round down fractional units less than one-half; round up fractional units one-half or greater. Quantities measured in units of time will be measured to the nearest tenth of an hour.
- B. Prices bid in the Bid Form constitute complete pricing for Work on the Contract including all incidental costs, which Work is as specified in the Contract Documents.
- C. Lump-Sum Measurement:
 - 1. Except as otherwise specified, measurement shall be for the entire item, unit of Work, structure, or combination thereof, as listed on the Bid Form.
 - 2. Progress payments for lump sum items will be made in accordance with a well-balanced, detailed, approved schedule of values that apportions the lump sum items. The apportionment for each lump sum item shall show measurable quantities and unit prices allocated to the different features of the Work and major subdivisions thereof. The summation of extensions of quantities and unit prices and related costs shall equal the amount of the lump sum bid for the item on the Bid Form.

1.03 REJECTED, EXCESS AND WASTED MATERIALS

- A. The following quantities will not be included for payment:
 - 1. Quantities of material wasted or disposed of in a manner not called for under the Contract or as a consequence of the means and methods used to perform the Work;
 - 2. Rejected loads of material, including material rejected after it has been placed by reasons of the failure of the CONTRACTOR to comply with the provisions of the Contract;
 - 3. Material not unloaded from the transporting vehicle;
 - 4. Material placed outside the lines indicated or specified, or established by the ENGINEER;
 - 5. Material not incorporated into the final Work;
 - 6. Material remaining on hand after completion of the Work; and

7. No payment will be made for loading, hauling, and disposing of rejected material.

1.04 INCIDENTAL WORK

- A. Work specified or shown in the Contract Documents, and Work that is otherwise inferable from the Contract Documents as necessary for the completed Project, for which the Bid Form does not provide a separate bid item, or which is incidental, or of an administrative or supervisory nature. Costs for such Work are compensated in the prices bid for other Work items. Include costs for such Work by allocating them appropriately amongst the bid items scheduled on Bid Form. No separate or additional payment will be paid for incidentals.

1.05 MEASUREMENT AND PAYMENT

- A. Lump Sum Items:
1. Description of items based on Bid schedule provided in Bid Form.
 2. Work and services of an administrative nature, as may be specified in the various Specification Sections, and not referenced in this Measurement and Payment statement of Lump Sum Bid Form, are considered incidental to the entire Work of the Contract and no separate or additional payment will be paid for such.
 3. The Lump Sum Price in the Bid Form is considered to be the bid amount for the entire Work involved in the Contract. The necessary appurtenance equipment, adjoining or attaching structures and materials and construction operations not mentioned herein are considered incidental to the Work, and as such, must be included in the applicable Bid price.
- B. Unit Price Items:
1. Description of items based on Bid schedule provided in Bid Form.
 2. Coordinate with the General Conditions as such may be amended by the Supplementary Conditions.
- C. Partial Payments:
1. No partial payments for products (materials, equipment, apparatus) stored on or off site will be made. Partial payments will only be made for partial or full installation of completed work unless specific written authorization from the ENGINEER and/or OWNER is received in advance.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 01 25 00
SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. General procedures and requirements for substitutions.
- B. Related Sections:
 - 1. Section 01 33 00 – Submittal Procedures
 - 2. Section 01 40 00 – Quality Requirements

1.02 REFERENCES

- A. Definitions
 - 1. Approved Equal: A product, material, item of equipment, item of machinery, or method of construction approved by the Engineer as functionally equal and sufficiently similar to an item specified, shown, or otherwise indicated in the Contract Documents for this Contract so that no changes in related Work will be required.
 - 2. Authority Having Jurisdiction (AHJ): Building Code officials, zoning officials, inspectors, and government and regulatory agencies given the authority to protect the public's health, safety, and welfare.
 - 3. Basis-of-Design: A sufficiently complete set of conditions, needs, and requirements from which the technical approach and key assumptions for preparing a design can be derived and taken into account when designing a facility or product; and which represents the objectives to be achieved in terms of design features, systems functionality, and performance.
 - a. The Basis-of-Design is a presentation of facts intended to ensure that the design concept is fully understood and is based on sound architectural and engineering decisions; and which defines and establishes the design criteria; outlines the design features of the system, equipment, and components; and defines their performance and operational characteristics consistent with that design criteria.
 - 4. Functional Equal: An item that the CONTRACTOR demonstrates is at least equal in quality, durability, appearance, strength, and design characteristics to the item of comparison; and that will reliably perform the function that the item of comparison was designed to perform at least as well as that item of comparison.
 - 5. Functionally Equal: Terminology indicating that the item this description is applied to is the functional equal of another item to which the item so described is being compared.
 - 6. Substitute: A product, material, item of equipment, or method of construction proposed by the CONTRACTOR as an alternative to those specified or otherwise indicated by the Contract Documents.

7. Substitution: A change in the design, products, materials, equipment, or method of construction from those required by the Contract Documents and originally proposed by the CONTRACTOR.
8. Additional terms used in this section are defined in the General Conditions and Section 01 33 00 – Submittal Procedures.

B. Reference Standards:

1. FM Approvals LLC (FM):
 - a. The Approval Guide, <https://www.fmaprovals.com/approval-guide>
2. ICC Evaluation Service, Inc. (ICC ES), <https://icc-es.org/evaluation-report-program/reports-directory/>
 - 1) Intertek Group plc:
 - b. Intertek Directory of Listed Product Search, <https://www.intertek.com/directories/>
3. Underwriters Laboratories, Inc. (UL):
 - a. UL Online Certifications Directory, <https://www.ul.com/services/digital-applications/ul-certification-database>

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. The Contractor is responsible for coordinating the information that will be necessary to accommodate the proposed substitutions with other stakeholders affected by the substitutions, including listing and distributing the changes or modifications that must be made to other parts of the Work and construction performed by the OWNER and other contractors.

B. Scheduling:

1. Requested substitutions may not adversely affect the Contract Construction Schedule.
 - a. In agreeing to the terms and conditions of the Contract, the CONTRACTOR has accepted the responsibility to schedule installation of the products specified and represents that the products specified will be available when required to comply with the accepted construction schedule, and to place orders for the required materials in a timely manner to meet the accepted construction schedule without delaying the Work.
 - b. Only if, prior to the issuance of the Notice to Proceed (NTP) or during the project, the product numbers or models specified have been discontinued or changed by the specified manufacturer(s) may the ENGINEER consider appropriate revisions to the schedule due to these extenuating circumstances.
2. The CONTRACTOR is responsible for providing a detailed comparison of the CONTRACTOR's Construction Schedule for this Contract using the proposed substitution compared with the CONTRACTOR's Construction Schedule using the products specified for the Work, including the effect on the overall Contract Time.

- a. If the specified product or method of construction cannot be provided within the Contract Time, the CONTRACTOR is responsible for submitting a letter from the manufacturer on the manufacturer's letterhead that indicates the lack of availability or delays in delivery.

1.04 SUBSTITUTIONS

- A. The Request and data supporting the Request for a substitute item or the approval of a proposed equal must be provided by the CONTRACTOR at no increase in the Contract Price.
- B. The CONTRACTOR is responsible for reimbursing the OWNER for all costs related to design, equipment, and construction changes made necessary by the CONTRACTOR's substitution of an alternative Supplier, product, or method of construction in order to achieve Work results equal in character, performance, and quality to the original design indicated in the Contract Documents.
 1. If the ENGINEER and/or the ENGINEER's subconsultants must expend time, resources and/or other expenses to evaluate substitutes proposed by the CONTRACTOR, to make changes to the Contract Documents, and/or to revise the provisions of other contracts for this PROJECT due to the substitution; the ENGINEER will record their time, resources and/or other expenses required so the OWNER can submit an invoice to the CONTRACTOR for reimbursement of these expenses.
 2. Necessary design changes may include, but are not limited to, changes to ratings or features of other equipment, changes to material sizes or types, requirements for new materials or equipment, and changes to structural features.
 3. Regardless of whether the ENGINEER approves a substitute item, the CONTRACTOR is responsible for reimbursing the OWNER for the charges invoiced by the ENGINEER and the ENGINEER's subconsultants for reviewing and evaluating each proposed substitute, and for revising the provisions of other contracts for this PROJECT due to the substitution.
- C. In making the request for substitution of an alternative Supplier, product, or procedure, the CONTRACTOR waives all claims for additional costs related to the substitution that may subsequently become apparent.
- D. Changes and/or Substitutions by the CONTRACTOR that include design changes:
 1. Have working drawings and calculations certified by a Professional Engineer registered in the State of Texas accompanied by calculations or other sufficient information to completely explain proposed method of construction, including but not limited to type of machinery and method proposed. Submit design calculations with working drawings.
 2. Review and approval of working drawings and calculations by ENGINEER does not relieve CONTRACTOR'S responsibility with regard to fulfillment of terms of Contract. CONTRACTOR to assume risk of error, with no responsibility by ENGINEER.

E. Substitution Procedures:

1. The general procedures for applying for approval of equals and substitutions for products, materials, and equipment or otherwise described in the Contract Documents are described in the General Conditions; and are expanded upon herein.
 - a. Substitution requests must be fully documented, properly and expeditiously submitted to the ENGINEER for approval, and receive approval before the equal or substitute items are purchased and incorporated into the Work of this Contract, and must do the following:
 - 1) Indicate in a statement why the specified material or product cannot be provided.
 - 2) Include a waiver of all claims for additional costs or time related to the substitution that subsequently become apparent due to the failure of the proposed substitution to produce the required results.
 - 3) Indicate the related design, equipment, construction, and schedule changes necessary to incorporate the proposed substitution.
 - b. Substitution requests should not require extensive changes to the Contract Documents.
 - c. Substitution requests should offer substantial advantages in cost, time, energy conservation, or other advantages to the OWNER after consideration of the additional responsibilities that the OWNER must assume due to the substitution.
2. Requirements for Products and Construction Procedures:
 - a. The substituted products incorporated into the Work of this Contract must comply with the following requirements:
 - 1) The products must be undamaged and, unless otherwise specified, new.
 - 2) For each specific purpose, the products must be the product of one manufacturer insofar as is practical.
 - 3) The products must be complete with all accessories, trim and finish, safety guards, and other devices and details required to provide a complete installation and make them suitable for the intended use and effect.
 - 4) Wherever practicable, the products must be of types that have been incorporated and used successfully in similar applications.
 - b. The quantities and quality levels specified or otherwise indicated in the Contract Documents are the minimum to be provided or performed.
 - 1) Numeric values indicated are the minimum or maximum values as noted, or as appropriate in the context of the requirements.
3. Substitution Restrictions:
 - a. Proposed substitutions, equals, and substitute means, methods, techniques, sequences, or procedures of construction may be provided or used only if judged to be appropriate and approved by the ENGINEER at the sole discretion of the ENGINEER.
 - b. Unless the identification or description of a product or construction procedure specified or otherwise indicated in the Contract Documents contains or is followed by a stipulation to the effect that no like, equivalent, or equal item

or procedure is permitted, or “no substitution is permitted”, then other products from other Suppliers or alternative means, methods, techniques, sequences, or procedures of construction may be proposed to the ENGINEER for approval if submitted to the ENGINEER on a timely basis allowing adequate time for review by the ENGINEER.

- 1) For products specified only by reference to a reference standard, provide any product from any manufacturer that complies with the requirements specified in both the standard and the Contract Documents.
- 2) If a product is specified by naming one or more products, but the words “approved equal” in association with the specified product indicate that the CONTRACTOR has an option to provide an equivalent unnamed product in lieu of the named products, the CONTRACTOR may request approval to provide an “equal” item by completing a Substitution Request form as attached to the end of this Section, which is required both for substitutions and to obtain approval of products not specifically named as acceptable for a specified application, and submitting the Substitution Request form to the ENGINEER for approval.
- 3) Where more than one manufacturer’s products are specified, the first-named manufacturer’s product is typically the Basis-of-Design Product, and alternative-named manufacturer’s product may have minor differences that must be accommodated.
- 4) Where an item is required to match an established sample or samples of a given color range, the ENGINEER’s decision whether or not a proposed product satisfactorily matches the sample is final.
 - a) Where no visual match can be satisfactorily made, even though the product selected conforms to other specified requirements, the CONTRACTOR must comply with the provisions of the Contract Documents concerning “substitutions” for selection of a matching product in another product category, or for noncompliance with the specified requirements.
 - b) Products may be rejected by the ENGINEER based solely on the lack of a visual match.
- c. Only the CONTRACTOR can submit requests for reviews and approvals of proposed substitutions to the ENGINEER.
- d. Requests for permission to provide proposed substitutions that are submitted to the ENGINEER from Subcontractors and Suppliers will not be accepted.
4. Prerequisites for Approval of Substitutions:
 - a. All proposed equal or substitute items and substitute means, methods, techniques, sequences, or procedures of construction must comply with the following requirements:
 - 1) They must be furnished by a reputable supplier or provider.
 - 2) They must be fully investigated by the CONTRACTOR and determined to be equal or superior in all respects to the product or procedure specified or otherwise indicated in the Contract Documents.

- a) The proposed equal or substitute items and substitute procedures must be fully compliant with the requirements of each Contract Document in which they are specified or otherwise described.
 - b) They must be functionally equal to the product, material, equipment, machinery, or procedure specified or otherwise described in the Contract Documents when compared to that item.
 - c) They must not be illegal.
 - d) The same warranty specified for the originally indicated item must be provided for the proposed equal or substitute items and substitute means, methods, techniques, sequences, or procedures of construction.
 - 3) They must be fully compatible with and coordinated with all interfacing items of Work and with the installation environment.
 - a) When the CONTRACTOR is given the option of selecting between 2 or more products for use on the PROJECT, the CONTRACTOR is responsible for verifying that the product selected will be compatible with the other products previously selected, even if the previously selected products were also selected as options.
 - 4) They must be appropriate for the proposed application.
 - 5) They must have received the approvals required by the Authorities Having Jurisdiction.
 - a) It is the responsibility of the CONTRACTOR to obtain the regulatory approvals required, including payment of additional fees associated with the agency reviews, if any.
 - 6) If a Basis-of-Design Product is identified in the Contract Documents, the submitted substitute must be equivalent in character, performance, and quality to the designated Basis-of-Design Product.
5. Proposed Equal or Substitute Items:
- a. For each equal or substitute item proposed in lieu of an item specified or otherwise required by the Contract Documents; the CONTRACTOR must use the Substitution Request form at the end of this Specification Section to submit to the ENGINEER a request which includes the following information for a review, an evaluation, and an approval of the proposed equal or substitute item:
 - 1) Identification of the item to be replaced by the proposed equal or substitute items.
 - 2) Certification that the proposed substitute item will adequately perform the function that the originally specified or indicated item was designed for, that the proposed substitute item is similar in substance to the specified or indicated item, and that that the proposed substitute item is suitable for the same application as the specified or indicated item.
 - 3) Appropriate supporting Product Data, such as catalog cuts, drawings, descriptions of products, fabrication details, and installation procedures.
 - 4) The extent, if any, to which the proposed substitution will impact the date of Substantial Completion.

- 5) Whether or not the proposed substitution will require changes in the Contract Documents, or in the provisions of other contracts for work on this Project, in order to adapt the design, equipment, construction, or schedule to substitute the proposed item.
 - 6) Whether or not the proposed substitution will require payment of license or royalty fees.
 - 7) Variations of the proposed substitute item from those specified or indicated; and engineering, sales, maintenance, repair, and replacement services available for the proposed substitute.
 - a) Include a detailed comparison of the significant qualities of the proposed substitution with those of the Work specified.
 - 8) An itemized estimate of costs and/or credits that will result directly or indirectly from the use of each proposed substitute item, including the costs of redesign, equipment, and costs of other prime contractors and/or their subcontractors affected by changes resulting from the use of each proposed substitute item and the proposed change, if any, in the Contract Price.
- b. The Substitution Request form must be submitted to the ENGINEER on a timely basis so the construction schedule is not delayed and the ENGINEER has sufficient time to perform a review and time to review subsequent related/required submittals.
 - c. The CONTRACTOR must not order, purchase, install, or use a proposed equal or substitute item until the ENGINEER's review is complete and the OWNER has issued a Change Order approving the substitution, or has issued an approved submittal, such as a Shop Drawing or Product Data, specifically approving the equal.
6. Proposed Substitute Means, Methods, Techniques, Sequences, or Procedures of Construction:
 - a. For each substitute means, method, technique, sequence, or procedure of construction proposed in lieu of a specific means, method, technique, sequence, or procedure of construction expressly required by the Contract Documents, submit a request to the ENGINEER for review, evaluation, and approval of the proposed alternative which includes the following information:
 - 1) The means, method, technique, sequence, or procedure of construction to be replaced by the proposed substitute means, method, technique, sequence, or procedure of construction.
 - 2) Sufficient information to allow the ENGINEER to determine whether or not the proposed substitute is equivalent to the means, method, technique, sequence, or procedure of construction originally required by the Contract Documents.
 - a) Detailed descriptions and drawings illustrating the proposed method may be required.
 - 3) The extent, if any, to which the proposed substitute means, method, technique, sequence, or procedure of construction will impact the date of Substantial Completion.

- 4) Whether or not the proposed substitute will require changes in the Contract Documents, or in the provisions of other contracts for work on this PROJECT, to adapt the design to the proposed substitute.
 - 5) Variations of the proposed substitute from the means, method, technique, sequence, or procedure of construction specified or indicated in the Contract Documents.
 - 6) An itemized estimate of costs and/or credits that will result directly or indirectly from the use of each proposed substitute, including the costs of redesign and costs of other prime contractors and/or their subcontractors affected by changes resulting from the use of each proposed substitute means, method, technique, sequence, or procedure of construction and the proposed change, if any, in the Contract Price.
7. Following submission of a request that includes the required information, the ENGINEER must be allowed a reasonable time within which to evaluate each request and submittal made related to proposed equal or substitute items and proposed substitute means, methods, techniques, sequences, or procedures of construction.
- a. The ENGINEER may request additional data regarding the proposed equal or substitute item, or substitute means, methods, techniques, sequences, or procedures of construction.
 - 1) Among other items, the ENGINEER may request a list of similar items installed for completed projects, including the project names and addresses and the names and addresses of the designers and owners of those projects.
 - b. At the sole discretion of the ENGINEER, an item proposed by the CONTRACTOR as an “approved equal” may be reviewed and approved without the necessity to comply with some or all of the requirements applicable to proposed “substitute” items.
 - c. Items that, in the sole opinion of the ENGINEER, do not qualify as an “approved equal” will be considered to be proposed “substitute” items.
 - d. Following the ENGINEER’s evaluation, a copy of the CONTRACTOR’s Substitution Request form for each proposed equal and substitute or proposed substitute means, methods, techniques, sequences, or procedures of construction will be returned by the ENGINEER to the CONTRACTOR marked with one of the following dispositions:
 - 1) Substitution approved.
 - a) This disposition indicates that the ENGINEER has approved the equal or substitute, and the OWNER will prepare and issue an appropriate Change Order or return an approved submittal, such as an approved Shop Drawing or approved Product Data, specifically documenting approval of the equal or substitute.
 - b) When a proposed equal or substitute receives this disposition, submit the additional information required by the Specifications (as appropriate).
 - 2) Substitution approved as noted.

- a) This disposition indicates that the ENGINEER has conditionally approved the equal or substitute, and the OWNER will prepare and issue an appropriate Change Order or return an approved submittal, such as an approved Shop Drawing or approved Product Data, specifically documenting approval of the equal or substitute after the nonconforming conditions noted have been satisfied by the CONTRACTOR to the satisfaction of the ENGINEER.
- b) When a proposed equal or substitute receives this disposition, submit the additional information required by the Specifications (as appropriate) to the ENGINEER for review.
- 3) Substitution rejected.
 - a) This disposition indicates that the ENGINEER has rejected the proposed equal or substitute, and it will not be allowed.
 - b) When a proposed equal or substitute receives this disposition, provide the specified materials or methods in lieu of the proposed equal or substitute item or procedure.
- 4) Substitution request received too late.
 - a) This disposition indicates that the ENGINEER has not approved the proposed equal or substitute because it has been received too late to be reviewed, evaluated, and incorporated into the Work without adversely impacting the PROJECT.
 - b) When a proposed equal or substitute receives this disposition, provide the specified materials or methods in lieu of the proposed equal or substitute item or procedure.
- 8. Approval of an item as an approved equal or substitute for an item specified or otherwise described in the Contract Documents by the ENGINEER does not relieve the CONTRACTOR from responsibility for complying with the Contract requirements.

1.05 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

- 1. Substitutions must receive the approvals required by the Authorities Having Jurisdiction.
 - a. If research/evaluation reports evidencing compliance with the building code in effect for the Project from a model code organization acceptable to the Authorities Having Jurisdiction are available and applicable, such as from ICC Evaluation Service, Inc. (ICC ES), submit them to the ENGINEER for information.

B. Preconstruction Testing:

- 1. For proposed substitute items requiring testing to verify compliance with the requirements specified or otherwise indicated in the Contract Documents, submit material test reports from a testing and inspection agency qualified as specified in Section 01 40 00 – Quality Requirements, that indicate and interpret the test results.

- a. Reports from a Nationally Recognized Testing Laboratory (NRTL), such as FM Approvals LLC (FM), Intertek Group plc, or Underwriters Laboratories, Inc. (UL) may be required.
- C. Site Samples:
 - 1. If applicable or requested to match an established sample or samples of a given color range, submit Samples to the ENGINEER for review and approval.

1.06 WARRANTY

- A. Special Warranty:
 - 1. At the option of the OWNER, a special performance guarantee or other surety arrangement with respect to each substitute may be required.
 - a. When requested by the ENGINEER, prepare a special performance guarantee or other surety arrangement with respect to each substitute for which the ENGINEER requests a special performance guarantee or other surety.
 - b. Submit the special performance guarantees or other sureties for these substitutes to the ENGINEER for approval.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

OWNER: Brazos River Authority															
PROJECT: De Cordova Bend Dam Low Flow Outlet Works Repair Project	DATE:														
LOCATION: Granbury, TX															
PROJECT NO:	SUBSTITUTION REQUEST NO.:														
RE:															
SPECIFICATION SECTION(S) / DRAWING(S) TO WHICH THIS REQUEST APPLIES															
Section Title(s): _____ _____	Section/Drawing Number(s): _____ _____														
Section Article(s)/ Paragraph(s)/ Subparagraph(s): _____ _____	Section Page Number(s): _____ _____														
PROPOSED SUBSTITUTION															
Substitution Description:															
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Original</th> <th style="width: 50%; text-align: center;">Proposed Substitution</th> </tr> </thead> <tbody> <tr> <td>Supplier:</td> <td></td> </tr> <tr> <td>Trade/Brand Name:</td> <td></td> </tr> <tr> <td>Model Number(s):</td> <td></td> </tr> <tr> <td>Installer(s):</td> <td></td> </tr> <tr> <td>Differences Between Proposed Substitution and Specified Product:</td> <td></td> </tr> <tr> <td colspan="2" style="text-align: center;"> <input type="checkbox"/> Point-by point comparative data attached </td> </tr> </tbody> </table>	Original	Proposed Substitution	Supplier:		Trade/Brand Name:		Model Number(s):		Installer(s):		Differences Between Proposed Substitution and Specified Product:		<input type="checkbox"/> Point-by point comparative data attached	
Original	Proposed Substitution														
Supplier:															
Trade/Brand Name:															
Model Number(s):															
Installer(s):															
Differences Between Proposed Substitution and Specified Product:															
<input type="checkbox"/> Point-by point comparative data attached															
Substitution History	<input type="checkbox"/> New Product <input type="checkbox"/> 1–4 Years Old <input type="checkbox"/> 5–10 Years Old <input type="checkbox"/> More Than 10 Years Old														
Does the substitution affect other parts of the Work? <input type="checkbox"/> No <input type="checkbox"/> Yes (If yes, explain below)															
BENEFITS TO OWNER OF ACCEPTING SUBSTITUTION															
Savings to Owner: _____ _____ \$ _____	Change in Contract Time? <input type="checkbox"/> No <input type="checkbox"/> Yes _____ Days Added _____ Days Deducted														

REASON(S) FOR NOT PROVIDING SPECIFIED ITEM OR METHOD			
Supporting Data Attached:	<input type="checkbox"/> Drawings	<input type="checkbox"/> Product Data	<input type="checkbox"/> Samples <input type="checkbox"/> Tests
	<input type="checkbox"/> Reports	<input type="checkbox"/> Other _____	
Attachments: <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px;"></div>			
CONTRACTOR CERTIFICATION AND SIGNATURES			
Submitted by: _____		Firm: _____	
The Undersigned certifies that the: <ul style="list-style-type: none"> Proposed substitution has been fully investigated and determined to be equal or superior in all respects to the specified product. Same warranty will be furnished for the proposed substitution as for the specified product. Same maintenance service and source of replacement parts, as applicable, is available. Proposed substitution will have no adverse effect on other trades and will not affect or delay the progress schedule. Cost data as stated above is complete; claims for additional costs, related to the accepted substitution, which may subsequently become apparent are to be waived. Proposed substitution does not affect dimensions and functional clearances. Contractor will make payment for changes to design, including Engineer's design, equipment, detailing, and construction costs caused by the substitution. Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects. 			
Contractors Signature: _____		Date: _____	
ENGINEER'S REVIEW AND DISPOSITION			
<input type="checkbox"/> Substitution approved:			
<input type="checkbox"/> Substitution approved as noted:			
<input type="checkbox"/> Substitution rejected:			
<input type="checkbox"/> Substitution request received too late:			
Engineers Signature: _____		Date: _____	
Additional Comments: <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 30%;"> <input type="checkbox"/> Contractor <input type="checkbox"/> Manufacturer </div> <div style="width: 30%;"> <input type="checkbox"/> Supplier <input type="checkbox"/> Engineer </div> <div style="width: 30%;"> <input type="checkbox"/> Subcontractor <input type="checkbox"/> Other _____ </div> </div>			

SECTION 01 26 00
CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Section includes administrative and procedural requirements for handling and processing Contract modifications (Proposed Contract Modifications).
- B. Related Sections:
 - 1. Section 00700 – General Conditions and Section 00800 – Supplementary Conditions: Definition of “Proposed Contract Modification” and provisions governing Change Orders and Written Amendments.
 - 2. Section 01 25 00 – Substitution Procedures
 - 3. Section 01 26 13 – Requests for Interpretation

1.02 PROPOSED CONTRACT MODIFICATIONS

- A. Proposed Contract Modification (“PCM”) requests shall be submitted to the ENGINEER as follows:
 - 1. CONTRACTOR shall use the "Proposed Contract Modification" form provided by OWNER.
 - a. Use the PCM form at the end of this Specification Section or a separate form provided by the OWNER.
 - 2. CONTRACTOR shall assign a sequential number to the PCM when issued.
 - 3. CONTRACTOR shall include with the PCM:
 - a. A complete description of the proposed modification.
 - b. The reason the modification is requested.
 - c. A detailed breakdown of the cost of the change (necessary only if the modification requires a change in contract amount).
 - d. A revised progress schedule indicating the effect on the critical path for the Project and a statement of the number of days the Project may be delayed by the modification
- B. ENGINEER will evaluate the PCM and provide a recommendation to OWNER.
- C. If OWNER agrees that a contract modification is required, the ENGINEER will issue a Change Order per the Contract Documents.
 - 1. The Change Order will be sent to the CONTRACTOR for execution with a copy to the OWNER recommending approval.
 - 2. Change Orders can only be approved by the OWNER.
 - 3. CONTRACTOR shall not perform Work on a PCM prior to execution of a Change Order and any such Work that is performed is performed at the CONTRACTOR's risk, and CONTRACTOR shall be solely responsible for any and all damages, costs, expenses and/or Claims related thereto.

4. No payment will be made for Work on Change Orders until approved by the OWNER.

- D. If OWNER does not approve the PCM, CONTRACTOR will be informed that the PCM is not approved, and construction is to proceed in accordance with the Contract Documents.

1.03 SUBSTITUTIONS

- A. For substitutions of items and/or work under the Contract Documents, see Specification Section 01 25 00 – Substitution Procedures.

1.04 REQUESTS FOR INTERPRETATION

- A. For requests for interpretation (“RFI”) of the Contract Documents, see Specification Section 01 26 13 – Requests for Interpretation.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

PROPOSED CONTRACT MODIFICATION (PCM)

OWNER	<u>Brazos River Authority</u>
PROJECT	<u>De Cordova Bend Dam Low Flow</u>
CONTRACTOR	<u></u>
ENGINEER	<u>Gannett Fleming, Inc.</u>
PCM NO.	<u></u>

DESCRIPTION OF PROPOSED MODIFICATION: We are proposing making the following modification(s) to the contract documents (attach additional documentation as necessary):

IF CONTRACTOR IS INITIATING THIS PCM, DOES THIS MODIFICATION(S) REQUIRE ANY OF THE FOLLOWING (if YES, attach description/documentation to this Form, including any cost or time changes, detailed cost breakdowns, payment information, and revised schedules):

- | | | |
|--|------------------------------|-----------------------------|
| 1. An increase or decrease in the Contract Price and/or Cost of Work? | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 2. An increase or decrease a change in the Contract Times? | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 3. Changes in Drawings and specifications? | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 4. Changes which impact the anticipated service life of the Work? | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 5. Changes that significantly impact operation and maintenance? | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 6. A deviation from the Contract Documents, including but not limited to substitutes and/or "or-equals"? | <input type="checkbox"/> YES | <input type="checkbox"/> NO |

BY: _____ DATE: _____

ENGINEER'S RESPONSE:

WE RESPOND TO YOUR REQUEST AS FOLLOWS:

☐ RECOMMEND FIELD ORDER ☐ RECOMMEND CHANGE ORDER ☐ OTHER

BY: _____ DATE: _____

ACTION TAKEN:

☐ PROPOSED CONTRACT MODIFICATION REJECTED.

BY: _____ DATE: _____

☐ FIELD ORDER ISSUED: NO: _____

☐ CHANGE ORDER ISSUED: NO: _____

SECTION 01 26 13
REQUESTS FOR INTERPRETATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Section includes administrative and procedural requirements for handling and processing Requests for Interpretation (“RFI”) of the Contract Documents.

1.02 REQUESTS FOR INTERPRETATION

- A. Submit Request for Interpretation (“RFI”) to the ENGINEER to obtain additional information or clarification of the Contract Documents.
 - 1. Submit a separate RFI for each item on the form provided by OWNER.
 - a. Use the RFI form at the end of this Specification Section or a separate form provided by the OWNER.
 - 2. Attach adequate information to permit a written response without further clarification. ENGINEER will return requests that do not have adequate information to the CONTRACTOR for additional information. CONTRACTOR is responsible for all delays resulting from multiple submittals due to inadequate information.
 - 3. A response will be made when adequate information is provided. Response will be made on the RFI form or in attached information.
- B. Response to an RFI is given to provide additional information, interpretation, or clarification of the requirements of the Contract Documents, and does not modify the Contract Documents.
- C. RFI reviews and responses do not constitute or imply approval or acceptance of a change in contract price, unit price, item price, and/or a time extension.
 - 1. If the RFI indicates that a contract modification is required, the ENGINEER will initiate a Proposed Contract Modification.
- D. RFI reviews and responses do not assume or imply that jurisdictional/permitting authority reviews/acceptance are completed, if applicable. The CONTRACTOR assumes responsibility and risk of work or any action including (but not limited to) ordering, fabricating, delivering, storing, and scheduling, in advance of jurisdictional/permitting authority review, if applicable.
- E. The ENGINEER may categorize the RFI’s by type (i.e., Type 1 - Clarification/Interpretations, Type 2 - CONTRACTOR Changes, Type 3 - CONTRACTOR Errors, Type 4 - Discovery, and Type 5 - Other).
 - 1. If the ENGINEER and/or the ENGINEER’s subconsultants must expend time, resources and/or other expenses to evaluate Type 2 or Type 3 RFI’s, the ENGINEER will record their time, resources and/or other expenses required so

the OWNER can submit an invoice to the CONTRACTOR for reimbursement of these expenses.

2. If requested, the CONTRACTOR is responsible for reimbursing the OWNER for all costs related to the ENGINEER's review of Type 2 and Type 3 RFI's.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

OWNER	Brazos River Authority	PROJECT NO.
PROJECT	De Cordova Bend Dam Low Flow	
CONTRACTOR		
ENGINEER	Gannett Fleming, Inc.	
		OWNER
		CONTRACTOR
		RFI NO.

REFERENCE DATA:		
SPECIFICATION SECTION NO. _____	PAGE NO. _____	PARA. NO. _____
SHEET NO. _____	ENTITLED _____	
DETAIL DESIGNATION _____	DRAWING ATTACHED (YES/NO) _____	

[illegible]

☐ INFORMATION, ☐ INTERPRETATION, ☐ CLARIFICATION IS REQUESTED FOR THE ITEMS DESCRIBED ABOVE OR IN ATTACHED MATERIALS REFERENCED ABOVE

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: General administrative provisions for coordinating construction operations on the Project including, but not limited to:
 - 1. General coordination.
 - 2. Record keeping.
 - 3. Disruption to facility services.
 - 4. Project meetings.
- B. Related Sections:
 - 1. Section 01 32 00 – Construction Progress Documentation
 - 2. Section 01 33 00 – Submittal Procedures
 - 3. Section 01 35 29 – Health Safety and Emergency Response Procedures
 - 4. Section 01 78 00 – Closeout Submittals

1.02 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Conditions and all Supplementary Conditions.
- B. Informational:
 - 1. Facility Services Shutdown Plan of Action, if necessary.
 - a. Submit at least 30-days prior to shutdown activity.
 - 2. Pre-construction meeting agenda items.
 - 3. Progress meeting agenda items.

1.03 COORDINATION

- A. The CONTRACTOR shall coordinate and ensure cooperation of CONTRACTOR's workers performing the Work, particularly with regard to OWNER's employees, and maintain efficient and continuous supervision.
- B. CONTRACTOR shall proactively and continuously communicate and coordinate with OWNER and ENGINEER on Site to address and resolve any spatial or access conflicts or misalignment, mis-location, or other issues relating to materials, components and equipment, or other aspects of the Work. In the event CONTRACTOR cannot resolve such conflicts at the point and time they arise, promptly advise ENGINEER.
- C. CONTRACTOR shall establish and continuously maintain cooperation with OWNER and ENGINEER. CONTRACTOR shall notify ENGINEER in the event of a conflict.

- D. Coordinate the Work of various trades having interdependent responsibilities for installing, connecting to, and placing in service all equipment.
- E. Coordinate requests for approved substitutes/“or-equals” to provide compatibility of space, operating elements, effect on the Work of other trades, and on the Work scheduled for early completion.
- F. Coordinate the use of Site and the sequence of installation of equipment or other Work that is indicated on the Drawings.
 - 1. Follow routings shown for tubes, pipes, conduits, and other items as closely as practical, with due allowance for available physical space, and subject to review by the ENGINEER.
 - a. Utilize space efficiently to maximize accessibility.
 - b. Adjust indicated routing of piping, utilities, and location of equipment, but only as needed to resolve spatial conflicts between the various trades. These adjustments shall be at no additional cost and subject to review by the ENGINEER. Document any such adjustments in the indicated routings on the Record Documents.
- G. In finished areas, except as otherwise shown, conceal ducts, pipes, wiring, and other non-finish items within construction. Coordinate locations of concealed items with finish elements.
- H. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in sequence required to obtain best results.
- I. Make adequate provisions to accommodate items scheduled for later installation, including accepted Bid Alternates and Work by others.
- J. Sequence, coordinate, and integrate the various elements of civil, mechanical, electrical, structural and any and all other relevant disciplines, systems, materials, and equipment. Comply at a minimum with the following requirements:
 - 1. Coordinate mechanical and electrical systems, equipment, and materials installation with other building components.
 - 2. Verify all dimensions by field measurements.
 - 3. Arrange for chases, slots, and openings in other building components during progress of construction.
 - 4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
 - 5. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment as permitted by codes to provide the maximum headroom possible.
 - 6. Coordinate the connection of systems with exterior underground and overhead utilities and services. Comply with the requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

7. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to the greatest extent possible. Conform to arrangements indicated by the Contract Documents.
8. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components.
9. Install systems, materials, and equipment to facilitate servicing, maintenance, and repair or replacement of components. As much as practical, connect for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to accessible locations.
10. Install access panel or doors where units are concealed behind finished surfaces.
11. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

1.04 RECORD KEEPING

- A. Keep record documents current.
- B. Do not permanently cover or otherwise conceal any Work until required information has been recorded.
- C. Mark all changes to Project record documents legibly in a contrasting color.
- D. Label each document "PROJECT RECORD" in neat, large, printed letters. Legibly mark contract drawings to record actual construction, showing:
 1. Horizontal and vertical location of utilities and appurtenances referenced to permanent improvements.
 2. Changes of dimensions and details.
 - a. Changes made by Change Order.
 - b. Details not on original Drawings.
 3. Legibly mark Specifications and Addenda to record:
 - a. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
 - b. Changes made by Change Order.
 - c. Other matters not originally specified.
 4. Legibly annotate Shop Drawings to record changes made after review.
 5. Delete ENGINEER's seals from record documents.
- E. See also Specification Section 01 78 00 – Closeout Submittals.

1.05 DISRUPTION TO FACILITY SERVICES

- A. Disruptions to existing utilities, piping, process piping, or electrical services shall be kept to a minimum.
 1. Prepare a Plan of Action in accordance the Contract Documents.
 2. Coordinate Work with OWNER, local utility company, and others.
 3. Provide temporary service when temporary disruptions to existing utilities are not acceptable.

4. Comply with requirements of the Contract Documents for any operation which requires shut down of some portion of facility.
- B. Prepare a written Plan of Action in accordance with the Contract Documents for approval for shutting down facility services, if necessary.
 1. Facility Services Shutdown Plan of Action shall be submitted at least 30-days prior to shutdown activity.

1.06 PROJECT MEETINGS

- A. Administrative and procedural requirements for Project meetings, including, but not limited to, the following:
 1. Pre-construction Conference.
 2. Requirement for attendance at Project meetings.
 3. Descriptions of the various types and frequency of Project meetings.
 - a. Preconstruction Meeting.
 - b. Job Progress Meetings.
 - c. Pre-installation Meetings.
 - d. Other Meetings.
 4. Responsibilities of meeting attendees:
 - a. Recording and distributing meetings minutes.
- B. Pre-construction Conference
 1. ENGINEER will schedule a pre-construction meeting and will notify the Contractor of the time and place of this meeting. ENGINEER will record and distribute meeting minutes.
 2. Attendance Required: OWNER's representatives, ENGINEER, special consultants as required by ENGINEER, CONTRACTOR, and major Subcontractors and Suppliers.
 3. The following CONTRACTOR representatives are required:
 - a. Project Manager/Superintendent
 - b. Quality Control Manager
 - c. Safety Manager
 - d. Major Subcontractor representatives
 - e. The CONTRACTOR has the option to invite additional parties as required.
 4. The pre-construction meeting agenda will, at a minimum, include the following items, but may not be limited to these items:
 - a. Distribution of Contract Documents.
 - b. Designation of personnel representing the parties.
 - c. Discussion of forms and formats for required submittals.
 - d. Procedures and processing of Shop Drawings, substitutions, pay estimates or Applications for Payment, Requests for Interpretation, Proposed Contract Modifications, the Contract closeout, and other Submittals.
 - e. Review of CONTRACTOR's preliminary progress schedule, Shop Drawing and Samples schedule, and schedule of values for the Work.
 - f. Review of Subcontractors and Suppliers.
 - g. Procedures for testing.

- h. Procedures for maintaining record documents.
- i. Any other issues deemed relevant by the ENGINEER or OWNER.
- 5. CONTRACTOR should distribute and/or be prepared to discuss:
 - a. Introduction of CONTRACTOR representatives and briefly describe each person's responsibilities.
 - b. General layout of the work site and staging area.
 - c. Preliminary construction schedule.
 - d. Describe the construction sequencing.
 - e. Discuss major equipment deliveries and priorities.
 - f. Construction methods.
 - g. CONTRACTOR's quality control (QC) personnel, approach and plan.
 - h. CONTRACTOR's Site Safety and Health Plan. See Specification Section 01 35 29 – Health Safety and Emergency Response Procedures.
 - i. Noise, emissions, dust, erosion, pollution, and housekeeping controls.
 - j. Preliminary Submittal schedule.
 - k. Schedule of values.
 - l. Anticipated schedule of payments
 - m. List of Suppliers and Subcontractors.
 - n. CONTRACTOR's organizational chart as it relates to this Project including contact information.
 - o. Letter indicating the agents of authority for the CONTRACTOR and the limit of that authority with respect to the execution of legal documents, contract modifications, and payment requests.
- 6. If CONTRACTOR wishes to add items to the meeting agenda, these items are to be submitted to the ENGINEER seven (7) days in advance of the meeting.

C. Progress Meetings

- 1. Attend meetings at Project field office or other location designated by ENGINEER. Progress meeting will be held on a weekly basis, or more frequently when directed by ENGINEER.
- 2. Attendance Required: CONTRACTOR project manager and superintendent, major Subcontractors and Suppliers, OWNER's representatives, ENGINEER and its consultants as appropriate for agenda topics for each meeting.
- 3. CONTRACTOR will make available the CONTRACTOR's field office for all meetings unless an alternate location is designated by the ENGINEER.
- 4. The ENGINEER will prepare the agenda and preside the meetings. ENGINEER will record and distribute meeting minutes.
- 5. CONTRACTOR will respond to questions and inquiries from attendees.
- 6. The CONTRACTOR will provide requested information to the ENGINEER in advanced to support the agenda and be prepared to discuss each agenda item.
- 7. Typical agenda items may include:
 - a. Attendance.
 - b. Review of any safety issues, safety statistics and discussions.
 - c. Review minutes of previous meetings.
 - d. Review of construction schedule, delayed activity, maintenance of construction schedule permanently lost time, pay estimates, cash flow projections, and payroll and compliance submittals.

- e. Field observations, problems, and necessary decisions.
- f. Identification of problems that impede planned progress.
- g. Review of Submittal schedule and status of Submittals.
- h. Review of RFI and PCM status.
- i. Review of off-site fabrication status and delivery schedules.
- j. Corrective measures to regain construction schedule.
- k. Planned progress during the succeeding Work period (i.e. 21-day look-ahead).
- l. 7-day history schedule for the previous 7 days within the look-ahead schedule.
- m. Coordination of projected progress.
- n. Maintenance of quality and Work standards.
- o. Effect of proposed Modifications on construction schedule and coordination.
- p. Review Project record documents.
- q. Other items relating to the Work.
- r. Other items raised by the CONTRACTOR, ENGINEER, or OWNER.

D. Pre-installation Meetings

- 1. Schedule and conduct pre-installation meetings for each activity affecting proper sequencing of the Work.
- 2. Schedule the pre-installation meetings with CONTRACTOR employees, Subcontractors, Suppliers, manufacturers, fabricators, and other affected parties as appropriate.
- 3. Hold pre-installation meetings for activities well in advance of the submittal dates for related Shop Drawings, and according to early start dates for the activity established in the approved Contract Schedules required under Section 01 32 00 – Construction Progress Documentation, so the activity is not delayed.
- 4. Prepare all documentation and procedures in advance for presentation at the meeting; including but not limited to, copies of drawings and Contract Drawings, Specifications, submittals, certifications, inspection and test procedures, and other pertinent documentation for use during the meeting. CONTRACTOR shall record and distribute meeting minutes.
- 5. Coordinate the work of CONTRACTOR employees, Subcontractors, Suppliers, manufacturers, fabricators, and other affected trades.
- 6. The Engineer may also require that a pre-installation conference be held with the Contractor and the Subcontractor(s) on selective items of Work.

E. Other Meetings

- 1. In addition to the regularly scheduled meetings, ad-hoc meetings may be called to address significant matters or situations that have a bearing on the successful execution of the Work.
- 2. On an as-needed basis, meetings may be called to discuss issues with representatives of local jurisdictions, public involvement representatives and news reporters, or other stakeholders.
- 3. CONTRACTOR and/or ENGINEER shall record and distribute meeting minutes.

April 2021

Brazos River Authority
De Cordova Bend Dam

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 01 32 00
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. General procedures and requirements for construction schedule and reporting progress.
- B. Related Sections:
 - 1. Section 01 31 00 – Project Management and Coordination
 - 2. Section 01 33 00 – Submittal Procedures

1.02 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Conditions and all Supplementary Conditions.
- B. Progress Documentation:
 - 1. Construction Schedule and updates
 - 2. Submittal Schedule and updates
 - 3. Photographs and videos

1.03 SCHEDULE REQUIREMENTS

- A. Schedule is to be in adequate detail to:
 - 1. Assure adequate planning, scheduling, and reporting during the execution of the Work, including planning and scheduling of inspections by the ENGINEER, OWNER, and/or regulatory authority.
 - 2. Assure the coordination of the Work of the CONTRACTOR and the various Subcontractors and Suppliers.
 - 3. Assist in monitoring the progress of the Work.
 - 4. Assist in evaluating proposed Change Orders and Project schedule.
 - 5. Assist the ENGINEER in review of CONTRACTOR's monthly payment requests.
- B. Provide personnel with five (5) years minimum experience in construction scheduling comparable to this Project.
- C. Provide the schedule in the form of a computer-generated critical path schedule which includes all Work to be performed on the Project. The presentation media must be compatible with OWNER's stipulated Project requirements. It is intended that the schedule accomplish the following:
 - 1. Give early warning of delays in time for correction.
 - 2. Require that detailed plans for the execution of the Work be prepared in the form of future activities and events in sequential relationships.

3. Establish inter-relationships of significant planned Work activities and provide a logical sequence of interdependence of planned Work activities.
 4. Provide continuous current status information.
 5. Allow analysis of the CONTRACTOR's program for the completion of the Project.
 6. Permit preparation of new schedules when an existing schedule is not achievable.
 7. Log the progress of the Work as it actually occurs.
- D. A time scaled critical path method arrow or precedence diagram shall be prepared to indicate each activity and its start and stop dates.
- E. Develop milestone dates and Project completion dates to conform to time constraints, sequencing requirements and contract completion date.
- F. Clearly indicate by a graphical method, the critical path for Work to complete the Project. Only one (1) critical path shall be shown on the construction schedule.
- G. The schedule is to be accompanied by a time scaled horizontal bar chart which indicates graphically the Work scheduled at any time during the Project. The chart is to indicate:
1. Complete sequence of construction by activity.
 2. Identification of the activity by structure, location, and type of Work.
 3. Chronological order of the start of each item of Work.
 4. The activity start and stop dates.
 5. The activity duration.
 6. Successor and predecessor relationships for each activity. Group related activities or use lines to indicate relationships.
 7. A clearly indicated critical path.
 8. Projected percentage-of-completion, based on dollar value of the Work included in each activity.
- H. Submit a separate submittal schedule.
1. See Article 1.07, Schedule of Submittals.

1.04 CONSTRUCTION SEQUENCE

- A. Perform the Work as required to complete the entire Project within the Contract Times.
- B. Work may be constructed in the sequence chosen by CONTRACTOR, so long as Substantial Completion and Final Completion of the Project are achieved within the times set forth in the Contract Documents, and CONTRACTOR complies with the conditions set forth below.
- C. Consider the sequences, duration limitations, and governing factors such as, but not limited to those outlined in this Section in preparing the schedule for the Work.

- D. Perform the Work not specifically described in this Section as required to complete the entire Project within the Contract Times.
- E. See also Specification Section 01 31 00 – Project Management and Coordination for additional requirements regarding coordination of disruption and/or shutting down of facility services.

1.05 SCHEDULE REVISIONS

- A. Revise the schedule if it appears that the schedule no longer represents the actual progress of the Work.
- B. Submit a written Schedule Recovery Report if the schedule indicates that any scheduled task is more than twenty-one (21) days behind schedule. The report is to include:
 - 1. Number of days behind schedule
 - 2. Narrative description of the steps to be taken to bring the Project back on schedule.
 - 3. Anticipated time required to bring the Project back on schedule.
- C. Submit a revised schedule indicating the action that the CONTRACTOR proposes to take to bring the Project back on schedule.
- D. Revised schedule is to be included with Proposed Contract Modifications for which an extension of time is requested or for which a reduction in times is contemplated.
- E. Updating the Project schedule to reflect actual progress is not considered a revision to the Project schedule.

1.06 FLOAT TIME

- A. Float time is defined as the amount of time between the earliest start date and the latest start date of a chain of activities on the construction schedule.
- B. Float time is not for the exclusive use or benefit of either the CONTRACTOR or OWNER.
- C. Where several subsystems each have a critical path, the subsystem with the longest time of completion is the critical path and float time is to be assigned to other subsystems.
- D. Contract Times cannot be changed by the submission of the progress schedule. Contract Times can only be modified by approved change order.
- E. Progress schedule completion dates must coincide with Contract Times. Time between the end of construction and the contract completion date is to be indicated as float time.

1.07 SCHEDULE OF SUBMITTALS

- A. Allow reasonable time for ENGINEER to review submittals and for possible resubmittal depending on the size of submittal, but not less than 14 calendar days.
- B. Submit the required submittals for review or approval within the time specified within the Contract Documents or as necessary to accommodate the Project schedule. Indicate a reasonable review time on the Schedule of Submittals, but not less than 14 calendar days, that will satisfy the requirements of the Progress Schedule. Refer to technical Specification sections for submittals required.
- C. Schedule of Submittals: Submit a separate submittal schedule indicating the dates when the submittals are to be sent to the ENGINEER.
1. Indicate submittals required by Specification section number and Article with a brief description.
 2. List specific date each submittal is to be sent to the ENGINEER (Projected Date of Transmittal).
 3. List specific date each submittal must be processed in order to meet the proposed schedule (Projected Date of Approval).
 4. Allow time to review submittals, taking into consideration the size and complexity of the submittal, the submission of other submittals, and other factors that may affect review time.
 5. Allow time for re-submission of the submittals for each item. CONTRACTOR is responsible for delays associated with additional time required to review incomplete or erroneous submittals and for time lost when submittals are submitted for products that do not meet specification requirements.
 6. List specific date product must be delivered to Project site in order to meet the proposed schedule (Projected Date of Delivery). If the submittal item is administrative (e.g. Superintendent's Qualifications), note the Projected Date of Delivery as "N/A".
- D. Schedule of Submittals shall be updated periodically to reflect changes and to keep the schedule current. Submit schedule updates at the progress meetings (see Specification Section 01 31 00 – Project Management and Coordination) and upon request of the ENGINEER and/or OWNER.
- E. Update the schedule at the end of each monthly partial payment period to indicate the progress made on the Project to that date.

F. The following is an example partial submittal schedule:

Spec Section	Sub Section	Type ¹	Description	Projected Dates		
				Transmittal	Approval	Delivery
01 40 00	1.06.A.1	QA	Superintendent's Qualifications			
01 40 00	1.06.A.2	QA	Safety Representative's resume			
01 40 00	1.06.A.3	QA	Quality Manager's resume			

01 40 00	1.07.B.3.d	QA	Quality Control Inspection Personnel resumes			
01 40 00	1.07.B.1	PRE/QC	Quality Management Plan			
01 40 00	1.07.B.3.a	QA	Principal Construction Staff			
01 40 00	1.07.B.5.a.3	INF/QC	Shop and Field Procedures and Instructions			
01 40 00	1.07.B.6.a	QC	Daily Quality Control Reports			
01 40 00	1.07.B.12.d	QC	Inspection and Test Plan			
01 40 00	1.07.B.15.b	QC	Nonconformance Reports			
01 40 00	1.07.B.17.b.5	QC	Index of Quality Control Records			
01 40 00	1.07.B.5	QC	Quality Audit Plan			
01 40 00	1.07.B.19.f	QC	Quality Audit Reports			
41 24 26	1.05.A	QA	HPU Manufacturer Qualifications			
41 24 26	1.04.B	SD	HPU Shop Drawings			
41 24 26	1.04.D	INF	HPU Factory Test Plan and schedule			
41 24 26	1.04.D	INF	HPU Factory Test Report			
41 24 26	3.04.E	INF	Field Operation Test Plan and schedule			
41 24 26	3.04.L	INF	Field Operation Test Report			
41 24 26	3.06.F	INF	Final Acceptance Testing Plan			
41 24 26	3.04.G	COORD	Final Acceptance Testing weekly status reports			
41 24 26	3.04.I	INF	Final Acceptance Testing Report			
41 24 26	1.04.E	CLO	Operation and Maintenance Manuals			
41 24 26	1.07	CLO	HPU Manufacturer Warranty			
41 24 26	1.04.E.3	CLO	Spare parts			

¹. Type Key:

PRE	Preconstruction	QA	Quality Assurance
SD	Shop Drawing	QC	Quality Control
SAM	Sample	INF	Informational
COORD	Coordination	CF	Construction Photos
PD	Product Data	CLO	Closeout

1.08 CONSTRUCTION PROGRESS AND DOCUMENTATION

- A. Assume complete responsibility for maintaining the progress of the Work per the schedule submitted. If the CONTRACTOR fails to make a milestone date, or if progress on an element of the Work falls behind schedule, CONTRACTOR shall take necessary action to restore the entire Project to the schedule.
- B. Prepare and submit a Progress Schedule for the Work and update the schedule on a monthly basis for the duration of the Project.
- C. Provide schedule in adequate detail to allow ENGINEER to monitor the Work progress, to anticipate the time and amount of progress payments, and to relate submittal processing to sequential activities of the Work.

- D. Incorporate and specifically designate the dates of anticipated submission of submittals and the dates when submittals must be returned to CONTRACTOR into the schedule.
- E. Take into consideration the requirements of the Contract Documents when preparing schedule.

1.09 PHOTOGRAPHIC DOCUMENTATION

- A. Furnish photographs of the Site to clearly depict existing pre-construction conditions. Equipment used shall place a date and time stamp on each image. At a minimum, provide the following:
 - 1. Provide a minimum of 30 different views.
 - 2. Photograph significant areas of future construction.
 - 3. Photograph areas of adjacent property, unusual site conditions, or other areas of special concern.
- B. Furnish photographs monthly to clearly depict the progress of construction from the last time photographs were taken. Equipment used shall place a date and time stamp on each image. At a minimum, provide the following:
 - 1. Provide a minimum of 10 different views.
 - 2. Photograph significant areas of construction progress.
 - 3. Submit photographs with the monthly pay request.
- C. Furnish photographs of the Work to clearly depict the completed Project. Equipment used shall place a date and time stamp on each image. At a minimum, provide the following:
 - 1. Provide a minimum of 30 different views.
 - 2. Photograph all significant areas of completed construction.
 - 3. Completion photographs are not to be taken until all construction trailers, excess materials, trash and debris have been removed.
- D. Provide a video, in a format suitable to ENGINEER, of the construction right-of-way prior to the beginning of the Work. Equipment used shall place a continuous date and time stamp.
 - 1. Record the condition of all existing facilities in or abutting the construction right-of-way including but not limited to streets, curb and gutter, utilities, driveways, fencing, landscaping, etc.
 - 2. Perform recording after construction staking when possible but prior to any clearing.
 - 3. Provide one copy of the video, dated and labeled to the ENGINEER before the start of construction. Provide additional videography as directed by the ENGINEER if the video provided is not considered suitable for the purpose of recording pre-existing conditions.

- E. All photographs and an electronic copy of each photograph taken are to become the property of the OWNER. Photographs may not be used for publication, or public or private display without the express written consent of the OWNER.

1.10 QUALITY ASSURANCE

- A. Photographs shall be clear with proper exposure. New photographs are to be taken immediately if photos of an adequate quality cannot be produced. Photographs shall be of a quality to permit enlargements and subject to ENGINEER approval.

1.11 SUBMITTALS FOR PHOTOGRAPHIC DOCUMENTATION

- A. Submittals shall be in accordance with the Contract Documents and shall include:
 - 1. Submit electronic copies of photographs of pre-existing conditions.
 - 2. Submit electronic copies of photographs of monthly progress with pay request.

1.12 MANUFACTURER'S PHOTOGRAPHS

- A. Submit photographs to document progress of shop manufacturing and submit with each payment request.
- B. Photographs: Photographs shall be in jpeg format.
- C. Identify photographs with subject, date, time, shop location, and project identification.
- D. Submit an electronic copy of the photographs with each payment request.

PART 2 PRODUCTS

2.01 PHOTOGRAPHS

- A. Photographs shall be provided in digital format with a minimum resolution of 1280 X 960 - fine, no digital zoom.
- B. Photographs shall be taken at locations acceptable to the ENGINEER.
- C. Provide an electronic copy of the photographs on media acceptable to OWNER and ENGINEER.
- D. Identify and/or electronically organize photographs by:
 - 1. Project Name
 - 2. Date, time, location, and orientation of the exposure
 - 3. Description of the subject of the photograph.

PART 3 EXECUTION (NOT USED)

END OF SECTION

April 2021

Brazos River Authority
De Cordova Bend Dam

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 01 32 36.10

VIDEO, TEMPERATURE & HUMIDITY MONITORING AND DOCUMENTATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Requirements for temporary video recording surveillance system of the construction from mobilization to final completion.
2. Requirements for temporary jobsite temperature and humidity monitoring of the Low Flow Intermediate Well during surface preparation and coating work.

B. Related Sections:

1. Section 01 33 00 – Submittal Procedures
2. Section 26 05 00 – Common Work Results for Electrical

1.02 REFERENCES

A. Reference Standards:

1. National Electric Code (NEC)

1.03 SUBMITTALS

A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Conditions and all Supplementary Conditions and Section 26 05 00, Common Work Results for Electrical:

1. Product Data:
 - a. Specification sheets (cut sheets) of proposed equipment.
 - b. Web access information (secured link and password)
2. Sample:
 - a. Sample image of camera view.
3. Shop Drawings:
 - a. Plan of proposed camera system including camera location and connection details.
 - b. Plan of proposed temperature and humidity monitor locations and connection details.
4. Closeout Submittals:
 - a. Discs/file transfer of complete recorded camera images.
 - b. Discs/file transfer of complete recorded temperature and humidity data files.

PART 2 PRODUCTS

2.01 CAMERA PERFORMANCE

A. Requirements:

1. High-definition (HD) robotic pan-tilt-zoom web camera (color).

2. Minimum 1080p.
3. Minimum 10x (HD) optical zoom capabilities.
4. Powered by standard 110V AC. Include thermostatically controlled heater/blower.
5. Outdoor rated and vandal resistant camera housing.
6. Secured web access for the OWNER and ENGINEER to view current and past images.
7. Capture and save an image of the equipment deck and low flow stilling basin at least every 30 minutes, 24 hours a day.
8. Camera mounting accessories as required.
9. 4G LTE modem
10. Obtain a 4G LTE carrier service as part of the contract for the duration of the project.
11. Include service costs for the duration of the project.
12. Provide all installation, setup, and configuration as required. Provide training for the OWNER and ENGINEER to view images.

B. Manufacturer/Provider:

1. TrueLook Construction Cameras.
 - a. www.truelook.com
2. Approved equal.

2.02 TEMPERATURE AND HUMIDITY PERFORMANCE

A. Requirements:

1. Temperature and humidity data logger within the north and south low flow intermediate wells adjacent to the gate inlets which will monitor and log air temperature and humidity throughout coating work (from surface preparation through final curing).
2. Sensor Unit: Washdown waterproof design:
 - a. Bulk polymer resistive humidity sensor (2%) and can withstand 100 % saturation
 - b. Temperature sensor platinum 1000 ohm 385 RTD
 - c. surface mounted or mounted to a single gang back box
 - d. epoxy hardened waterproof case, connector, and stainless-steel cover
 - e. flying leads for terminations
 - f. Two (2) 4-20 mA outputs, each 700 ohm load
 - g. 12-36 VDC loop powered
 - h. Zero Adjustment- ± 20 %
 - i. Span Adjustment- ± 10 %
 - j. Sensitivity-0.1% RH
 - k. Approvals- CE
 - l. Warranty -1 year
 - m. Manufacturer:
 - 1) Telaire Model # EHRHT-2
3. Sensor Unit shall be outdoor rated.
4. Temperature sensor range: -20 to 140°F (-29 to 60°C)
 - a. Measurement accuracy: $\pm 0.5^\circ\text{F}$ ($\pm 0.3^\circ\text{C}$) @ 77 degrees F

5. Humidity sensor range: 0-100%RH
 - a. Measurement accuracy: $\pm 2\%$ RH at 30-95% RH
6. Provide a NEMA 6/IP67 non-metallic terminal box within 10" of the sensor flying leads 8" x 8" 4" deep with terminal blocks to connect two 4-20mA signals. Seal box as required to make watertight where the flying leads enter.
7. Provide RGS conduit from the NEMA 6/IP67 up to the enclosure for the datalogger/cellular modem. Two (2) Belden #8719 TSP #16 SHLD, $\frac{3}{4}$ " RGS conduit from location at the bottom of the wet well up to cellular modem location on the top deck.
8. Data Logger- Log Box Wi-Fi from Novus Automation(
www.novusautomation.com)
 - a. Input two 4-20mA signals
 - b. Battery Voltage and external power supply
 - c. Display -3 lines with 4-1/2 digits, 15 bits
 - d. 140,000 records
 - e. Record Interval" 1 s to 18 hour
 - f. Variable Record- Instantaneous or average
 - g. Acquisition Trigger- Date/hour, Start Button, Digital Input, or by Software
 - h. Communications: WIFI 802.11 b/g/n ; USB
 - i. Configuration Software- Nxperience for Windows
 - j. Protocols-MQTT and Modbus TCP
 - k. Power Supply: 10-30VDC
 - l. Battery Backup- 4 AA alkaline batteries- provide 4
 - m. Operations Temperature: 4 to 158 degrees F
 - n. Rated IP 40
 - o. Install in a non-metallic WIFI/LTE friendly box as called out.
9. Cellular LTE/WIFI Gateway-LTE³-1 from MicroHard-LTECube-CAT1-AT1-WIFI-Kit
 - a. Shall Support AT&T Bands LTE CAT1; Bands 2,4,5,12; UMTS/HSPA Bands 2,5; Verizon LTE CAT1; Bands 4,13
 - b. Cellular Data- LTECAT1; download up to 10 MBPS; Upload up to 5 MBPS
 - c. WIFI- 802.11 b/g/n (2.4 GHZ)
 - d. Ethernet- 10/100 Base-T, Auto MID/X IEEE 802.3
 - e. Power: 7-30VDC; PoE (passive, max 24V); USB powered (5V, 1.5A)
 - f. Connectors:
 - 1) Antennas-2xSMA Female (Main, Diversity)
 - 2) Data-RJ-45(Ethernet)
 - 3) 4 Pin Interlock (Vin)
 - 4) USB-Micro AB
 - 5) SIM- Nano(4FF) 1.8/3.0 V
 - g. Operating Temperature: -40 to 185 degrees F; Humidity 5-95% non-condensing
 - h. Approvals: FCC/IC; PTCRB; Carrier Specific
 - i. Setup security on the WIFI, change the default username and default password. Setup the WIFI for maximum speed and to provide successful communications with the Novus Data Logger.

- j. Setup up the internal firewall for security and provide all network configuration including coordination with the cellular carrier, NAT, and obtaining and setting static IP address.
 - k. Primary communications- set up WIFI between the data logger and the LTE/WIFI modem; if possible, utilize a USB to Ethernet adapter. Other wise use WIFI
10. Enclosure: minimum 16" x 12" x 6" deep, non-metallic, NEMA 4/4X, WIFI and LTE friendly- install the data logger, cellular gateway, power supply, terminals, circuit breaker, position and wall mount on the outside of the HPU shed for best reception of the LTE cellular signal
11. Accessories:
- a. 24 VDC Power Supply- Phoenix Contact 5 ampere-Quint PS/1AC/24DC/5(use to power the data logger, cellular modem, and the RH/Temperature sensor 4-20mA 2 wire signals and unit
 - b. Provide a 15 amp, 120VAC, DIN rail mounted UL Listed circuit breaker, minimum of 10KAIC
 - c. Provide 600-volt terminal blocks, qty. as required
 - d. Provide #14 MTW wire as required internal
 - e. Provide Belden #8719 internal 4-20mA wiring
 - f. Provide a USB to Ethernet adapter (if required and/or needed for communications from the data logger to the modem)
12. Web Storage and Access Service shall be for the duration of the construction for the project.
13. Provide secured web access for the OWNER and ENGINEER to view current readings, graphically chart both temperature and humidity, and store data.
14. Capture and save a reading of RH and Temperature at least every 320 minutes, 24 hours a day.
15. Provide all installation, setup, and configuration as required. Provide training for the OWNER and ENGINEER to view the recorded RH/Temperature and all logs via the web portal. Spares: Provide one spare RH/Temp. sensor units, one for each wet well.

B. Manufacturer/Providers:

1. CAS Dataloggers, Inc.; www.dataloggersinc.com; tking@dataloggersinc.com; 440-490-4831-contact Tony King
Telaire-RH/temp. Sensor;Novus Automation-LOGBOX Wi-Fi(data logger);Microhard-LTECube-1(LTE/WIF Modem)
- a. Provide Web Storage and Access Service for the Logbox Wi-Fi Unit.
 - b. Provide **Basic Novus Cloud service** for one year (250,000 data records, 1-month storage, 5 Dashboard custom); set up for OWNER/ENGINEER to monitor the RH and Temp in each wet well and download/export data records and reports. Email notification and up to 20 users and 2 user profiles, data access via API through device tokens. Utilize MQTT protocol.
 - c. Provide alarm notifications if approaching maximum records.
 - d. Novus factory Engineer or authorized representative shall set up and deploy and assist the CONTRACTOR.

- e. CONTRACTOR shall purchase a cellular data plan from AT&T (or the local provider), provide a SIM card for the LTE modem and provide a minimum of a 1 year 250 Mbyte Data Plan in the bid price.
2. Approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install all equipment and materials in accordance with the manufacturer's recommendations and specifications. The work shall also be in accordance with approved submittals and applicable codes.
 1. Install in accordance with the 2017 National Electric Code and the local authority having jurisdiction.
 2. Equipment hardware shall be installed in accordance with UL requirements.
 3. Provide 120 VAC to the camera from the nearest panelboard power source; 15 ampere breaker. Provide 2#12, 1 #12 ground in ¾" RGS conduit, and field route and install. Provide overcurrent protection as required to meet the camera load and the 2017 NEC and the AHJ.
 4. Provide 120 VAC to the LTE/Data Logger Enclosure from the nearest panelboard power source, 15-ampere breaker. Provide 2#12, 1 #12, ground in ¾" RGS conduit and field route and install. Provide the overcurrent protection as required to meet the load and the 2017 NEC and the AHJ.
 5. Provide power from the existing 240/120VAC panelboard LGMPZ- add new circuit breakers (match type, style, model) or utilize any existing spare circuit breakers.
- B. Camera:
 1. Securely mount on the existing equipment deck light pole or location approved by the ENGINEER such that the camera provides an unobstructed view of the equipment deck, and low flow stilling basin.
 - a. No drilling, cutting, or tapping of existing structures or equipment is allowed unless approved by the ENGINEER.
 2. Installed and operational continuously from mobilization through final completion.
 3. The view and extent of the camera images shall not change throughout the project without approval from the ENGINEER.
- C. Temperature and Humidity Data Loggers:
 1. Secure within the north and south low flow intermediate wells (2 total) adjacent to the gate inlets which will monitor air temperature and humidity.
 2. Installed and operational throughout coating work (from surface preparation through final curing).
 3. The location of the data loggers shall not change throughout the project without approval from the ENGINEER.
 4. Furnish and install the Cat. 6 outdoor rated cable and support as required for the duration of the project and protect in ¾" conduit from near(adjacent to) the LAN

switch out to the entry into the intermediate wells(for both wells) and then exposed into the well to connect to the RH/Temp. sensor unit. Field install and field route as required and avoid all obstructions; support on the well wall as required above the high-water level for the duration of the project. Cable clamps, ties, supports shall be corrosion resistant non-metallic or stainless steel and designed to last the entire project.

3.02 FIELD QUALITY CONTROL

- A. Operational Testing: The CONTRACTOR shall perform thorough operational testing and verify that all system components are fully operational.

3.03 MAINTENANCE

- A. During the project period, the CONTRACTOR shall be responsible for maintenance, including cleaning and repair of the system including the repair of workmanship defects, free of charge (parts and labor) to provide fully functioning equipment.
- B. The installer shall correct any system defect within six (6) hours of receipt of call from the OWNER or ENGINEER.

3.04 CLOSEOUT

- A. Upon completion of the temporary devices required recording times, submit:
1. Submit electronic files of complete recorded camera images.
 2. Submit electric files of complete recorded temperature and humidity data files.
 3. Remove all temporary equipment and supporting connections and restore any damaged areas to pre-installation condition.

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. General procedures and requirements for submittals.
- B. Related Sections:
 - 1. Section 01 25 00 – Substitution Procedures

1.02 DEFINITIONS

- A. The term shop drawing used throughout this Section and the Contract Documents includes manufacturer's product data, shop drawings, samples, certificates and other submittals.
 - 1. Product Data: Manufacturer's descriptive literature, product specifications, performance and capacity rating schedules, published details, and installation instructions.
 - 2. Shop Drawings: CONTRACTOR or manufacturer prepared, completely dimensioned and annotated detail drawings of the products presented.
 - 3. Samples: CONTRACTOR or manufacturer prepared and delivered physical samples as requested in the various Specifications Sections.
 - 4. Certificates: CONTRACTOR or manufacturer prepared written instruments certifying product compliance with the Contract Documents. The written instruments shall include test records or reports, and such other types of certificates as required by the Specifications.
 - 5. Other Submittals: Other submittals include, but are not limited to, other technical documents, operation and maintenance documents, installation procedures, work plans, field data, training documents, and other required submittals.

1.03 SUBMISSION OF SHOP DRAWINGS AND OTHER SUBMITTALS

- A. The CONTRACTOR is responsible for the coordination and completion of all contractual work and submittals.
- B. No product shall be accepted for delivery to the site until the Submittal(s) have been found acceptable to the ENGINEER. Any Submittal review requiring resubmittal shall be deemed not found acceptable.
- C. Submit to the ENGINEER for review, one electronic copy (Shop Drawings) of required submittal items. Submit hard copies at the request of the OWNER or ENGINEER. ENGINEER will return reviewed submissions. The CONTRACTOR is responsible for providing additional copies if needed for distribution to suppliers and/or subcontractors.

- D. CONTRACTOR design items:
1. Have working drawings and calculations signed by a Professional Engineer licensed in the State of Texas in good standing.
 2. Review and approval of CONTRACTOR design items by the ENGINEER does not relieve CONTRACTOR's responsibility with regard to fulfillment of terms of the Contract. CONTRACTOR to assume risk of error, with no responsibility by ENGINEER.
- E. Submittals shall be processed and delivered electronically on software platform provided by ENGINEER, except for the following:
1. Samples and color selections shall be delivered by mail or courier to the ENGINEER for review.
 2. Final hard copies of O&M Manuals shall be delivered by mail or courier. Review copies shall be submitted electronically.
 3. Make all hard copy submissions to the ENGINEER using the following mailing address unless requested otherwise:
 - a. 4510 Mambrino Hwy
Granbury, TX 76048
- F. Submittal No.: Number each Shop Drawing using Specification Section numbers followed by 1.0, 2.0, 3.0, etc. for each submittal within a Section. Resubmittals must include .1, .2, .3, etc. in addition. For example, if the fifth item submitted in Section 03 30 00 is returned for correction three times, the next resubmittal number will be 03 30 00-5.3.
1. If a submittal is associated with the ENGINEER's drawing, number using the sheet numbers followed by 1.0, 2.0, 3.0, etc. for each submittal. Resubmittals must include .1, .2, .3, etc. in addition. For example, if the fifth item submitted regarding Sheet S001 is returned for correction three times, the next resubmittal number will be S001-5.3.
- G. The CONTRACTOR shall have a rubber (or electronic) stamp made up in the following format:

CONTRACTOR NAME

PROJECT: _____
LOCATION: _____
CONTRACT NO: _____
OWNER: _____

CONTRACTOR CERTIFICATION STATEMENT: By this submittal, I hereby represent that I have determined and verified field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with Contract Drawings, Specifications, other applicable approved shop drawings and Contract requirements. All affected contractors and suppliers are aware of and will integrate this submittal into their own work.

DATE: _____

SUBMITTAL NO: _____

SUBMITTAL NAME: _____

SPECIFICATION SECTION: _____

SPECIFICATION PARAGRAPH: _____

DRAWING NUMBER: _____

SUBCONTRACTOR NAME: _____

SUPPLIER NAME: _____

MANUFACTURER NAME: _____

CERTIFIED BY: _____

- H. This stamp, "filled in", should appear on the title sheet of each shop drawing, on a cover sheet of submittals in an 8-1/2" x 11" format, or on one face of a cardstock tag (min. 3" x 6") tied to each sample. The tag on the samples should state what the sample is so that, if the tag is accidentally separated from the sample, it can be matched up again. The back of this tag will be used by the ENGINEER for their receipt, review, and log stamp and for any comments that relate to the sample.
- I. After review by the ENGINEER, shop drawings will be returned marked as follows:
1. Reviewed: When shop drawings are returned "Reviewed", it means that the shop drawings have been found to be in conformance with the CONTRACT DOCUMENTS. The ENGINEER's review of the shop drawings does not relieve the CONTRACTOR from responsibility for errors or discrepancies in such shop drawings.
 2. Furnish as Corrected: When shop drawings are returned "Furnish as Corrected", it means that the shop drawings have been found to be in conformance with the Contract Documents, provided the changes noted by the ENGINEER are incorporated in the shop drawings. Shop Drawings returned "Furnish as Corrected" will not require resubmission.
 3. Revise and Resubmit: When shop drawings are returned noted "Revise and Resubmit", it means that the CONTRACTOR shall make the required corrections, and/or satisfactorily address comments and questions, and resubmit corrected Shop Drawings to the ENGINEER in accordance with the Contract Documents. Fabrication, ordering of materials, and/or performing work associated with the "Revise and Resubmit" submittal is not authorized, and doing so is at the CONTRACTOR's expense and risk.
 4. Rejected: When shop drawings are returned "Rejected", the submittal does not meet the requirements of the Contract Documents, and it means that the CONTRACTOR shall make completely new shop drawings and submit in accordance with the Contract Documents. Fabrication, ordering of materials, and/or performing work associated with the "Rejected" submittal is not authorized, and doing so is at the CONTRACTOR's expense and risk.
- J. For submittals that take more than two resubmittals (three total submittals) to review, the CONTRACTOR is responsible for reimbursing the OWNER for the ENGINEER's

review time beyond the third submittal. The ENGINEER will record their time, resources and/or other expenses required so the OWNER can submit an invoice to the CONTRACTOR for reimbursement of these expenses.

K. CONTRACTOR's Responsibility:

1. Assume risk of error and omission with no responsibility by ENGINEER. Review and approval of Shop Drawings, Samples, or Catalog Data by ENGINEER will not relieve responsibility with regard to fulfillment of terms of Contract.
2. No portion of work requiring a Shop Drawing, working drawing, sample, or catalog data allowed to be started nor materials to be fabricated or installed prior to approval or qualified approval of item. Fabrication performed, materials purchased or on-site construction accomplished that does not conform to approved Shop Drawings and data is at CONTRACTOR's risk. OWNER will not be liable for expense or delay due to corrections or remedies required to accomplish conformity.
3. Project work, materials, fabrication, and installation to conform with approved Shop Drawings, working Drawings, applicable Samples, and Catalog Data.

L. CONTRACTOR's Responsibility with Other Contractors:

1. Prior to submittal, review Shop Drawings of separate Contracts. Review makes available information relative to equipment data being furnished by Contractors having direct effect on construction procedures and schedules, thus reducing future construction interferences between Contracts.
2. ENGINEER will review general content of Shop Drawings in conjunction with requirements outlined in specifications and indicated on Drawings. Coordinate Shop Drawing data between individual Contracts. ENGINEER will not be responsible for coordinating Shop Drawing information, that being size and location of equipment, openings for piping, ducts and conduits, locations and sizes of concrete pads, anchor bolts, and similar Contract interface.
3. Distribute Approved Shop Drawings to other separate Contractors to make available, equipment information to correct conflicts prior to affecting construction phases. Should conflicts occur, make necessary revisions and adjustments with ENGINEER's approval at no cost to OWNER.
4. CONTRACTOR has responsibility to accumulate Shop Drawings from other Contractors for use in construction of this PROJECT. CONTRACTOR will maintain a Shop Drawing file containing current up-to-date Shop Drawings for each Contract.

1.04 SUBSTITUTION SUBMITTALS

- A. See Specification Section 01 25 00 – Substitution Procedures.

April 2021

Brazos River Authority
De Cordova Bend Dam

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SHOP DRAWING STAMP FORMAT

ABC Contractors, Inc.
Anytown, TX

Project: Construction of
XYZ Plant/Facility

Location: _____

Contract No.: _____

Owner: _____

Submittal No.: _____

Product: _____

Mfg. By: _____

Ref. Dwg/Spec: _____

"Certification Statement: By this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with the Contract Drawings, Specifications, other applicable approved Shop Drawings and all Contract requirements."

Contractors Review

☐ Approved

☐ Approved as Noted

By _____

Date

SECTION 01 35 29

HEALTH SAFETY AND EMERGENCY RESPONSE PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. General procedures for health, safety, and emergency response procedures.
 - 2. Site Safety and Health Plan procedures.
 - 3. Site Safety Supervisor requirements.
- B. Related Sections:
 - 1. Section 01 33 00 – Submittal Procedures
 - 2. Section 01 40 00 – Quality Requirements
 - 3. Section 01 41 00 – Regulatory Requirements
 - 4. Section 01 56 80 – Security Measures

1.02 REFERENCES

- A. Reference Standards:
 - 1. United States Government:
 - a. Occupational Safety and Health Administration (OSHA):
 - 1) 29 CFR 1910 - Occupational Health and Safety Standards.
 - 2) 29 CFR 1926 - Safety and Health Regulations for Construction.

1.03 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Conditions and all Supplementary Conditions.
- B. Action Submittals:
 - 1. Site Safety and Health Plan:
 - a. Submit at the Pre-Construction Meeting.
 - 2. Site Safety and Health Plan updates:
 - a. Submit at time of updates.
 - 3. Accident Reports:
 - a. Submit within 24-hours of incident.
- C. Qualifications:
 - 1. Name and qualifications of the SSHP Preparer.
 - 2. Name and qualifications of the Safety Supervisor.

1.04 QUALITY ASSURANCE

- A. Preparer of Site Safety and Health Plan (SSHP) minimum qualifications:
 - 1. Have working knowledge of all U.S. Department of Labor (OSHA) regulations.

2. Certified Industrial Hygienist, accredited by the American Board of Industrial Hygiene, or Certified Safety Professional certified by the Board of Certified Safety Professionals, to prepare or supervise preparation of a SSHP.
 3. Minimum of two (2) years of experience and have previously prepared and executed site-specific health and safety plans for not less than five (5) construction projects similar in nature, scope, and complexity.
- B. Safety Supervisor:
1. Have a working knowledge of all U.S. Department of Labor (OSHA) regulations, and have the ability to develop and conduct safety-training courses.
 2. Familiar with industrial hygiene equipment and testing as required for the protection of all employees.
 3. Certified in good standing in CPR and first aid.
 4. Possess current and in good standing all formal training in health and safety protocols required for executing the Work.

1.05 MINIMUM HEALTH AND SAFETY REQUIREMENTS

- A. This Section describes minimum health and safety requirements. The CONTRACTOR is solely responsible for all health and safety requirements and execution at the project site.
- B. Disregard of health and safety provisions and/or violations of health and safety contract requirements shall be deemed just and sufficient cause for immediate stoppage of work and/or termination of the Contract.
- C. The safety and health of the public and project personnel will take precedent over cost and schedule considerations. Any additional costs will be considered only after the cause of suspension or operations is addressed and work is resumed, however, this does not guarantee costs of work stoppage due to health and safety disregard and/or violations will be reimbursed to the CONTRACTOR. The ENGINEER and/or OWNER may stop work for health and safety reasons. If work is suspended for health and/or safety reasons, it shall not resume until approval is obtained from the ENGINEER and/or OWNER.
- D. Comply with applicable Occupational Safety and Health Administration (OSHA) rules and regulations as specified in 29 CFR 1910 Occupational Health and Safety Standards and 29 CFR 1926 Safety and Health Regulations for Construction.
- E. Keep a copy of the OSHA rules and regulations at the Site at all times.
- F. Keep a copy of applicable Material Safety Data Sheets (MSDS) for the materials stored and used at the Site at all times.
- G. Provide and fully equip a first aid station at the Site, for first-aid service to any who may be injured in the progress of the Work, and have standing arrangements for the transportation and hospital treatment of any employees who may be injured or who may become ill.

H. Safety Supervisor:

1. Designate a full-time on-site person who has specialized training and substantial experience in construction safety supervision to act as Safety Supervisor.
2. The Safety Supervisor is responsible for supervising the safety of persons on or about the work, and the property affected thereby.
3. Submit the name and qualifications of the Safety Supervisor to the ENGINEER for approval.
 - a. The Safety Supervisor must be acceptable to the ENGINEER and OWNER and their performance will be reviewed on a continuing basis.
 - b. The ENGINEER and OWNER reserves the right to revoke the approval of the Safety Supervisor and require a replacement.
 - 1) Once the Safety Supervisor has been designated, do not change the individual without the permission of the ENGINEER.

I. Site Safety and Health Plan (SSHP):

1. Prepare a Site Safety and Health Plan (SSHP) that addresses at minimum the following:
 - a. Specifies proposed procedures for satisfying OSHA requirements;
 - b. State occupational safety guidelines related to the worker and public;
 - c. Site-specific safety rules and procedures for dealing with the types of risk expected to be encountered on the Site;
 - d. Routine inspection schedules for verifying compliance with applicable laws and regulations;
 - e. Safety training of employees;
 - f. Medical, first aid, and emergency equipment and services at the Site including arrangements for emergency transportation;
 - g. Security procedures to prevent theft, vandalism and other losses at the Site;
 - 1) See Specification Section 01 56 80 – Security Measures for background check and security badging requirements.
 - h. List of emergency procedures; emergency contact information including phone numbers and email addresses; methods of communicating with emergency services including medical facilities, Police Departments, and Fire Departments, and other emergency services which may become necessary.
 - 1) Include directions to and from the nearest hospital.
 - i. Requirements for all workers in construction areas on the Site to wear OSHA-approved hard hats, and when appropriate, approved high visibility warning garments, steel toe work shoes, safety glasses, ear protection, and any other applicable safety equipment.
 - j. COVID-19 safety measures (if applicable).
 - k. Weather monitoring plan to regularly check (at minimum on a daily basis and more frequently as necessary) weather forecasts and conditions for developing weather and upstream dam releases that could impact the site.
 - l. Establish procedures to deal with emergencies, and written guidelines discussing these procedures:
 - 1) Fire;
 - 2) Thunderstorms/lightening;
 - 3) Flood/Water;

- a) Radial Gate Operations (by OWNER);
- 4) Injury to Employees;
- 5) Injury to general public;
- 6) Property damage, including property of utilities, i.e., gas, water, sewage, electric facilities, telephone or pedestrian and vehicle routes;
- 7) Hazardous/toxic material spill discharges;
- 8) Site evacuation;
- 9) Emergency access lanes; and
- 10) Developing dam safety issues and activation of the OWNER's Dam Safety Emergency Action Plan (EAP);
- m. Do not commence work at the Site until the Safety Plan has been approved.
- n. The CONTRACTOR is responsible for moving any equipment or materials expeditiously to provide access for emergency vehicles to adjacent properties at any time, at no increase in the Contract Price.
- o. Prior to the initiation of actual construction, post copies of the emergency procedure guidelines at the Site.
- p. Notify the OWNER and ENGINEER immediately of all on-the-job accidents and injuries.
- q. Report all on-the-job accidents and injuries to the OWNER and ENGINEER within 24-hours of the incident and submit all paperwork pertaining to such injuries, as required.
- 2. Submit the Site Safety and Health Plan to the ENGINEER at the Pre-Construction meeting for review and further discussion at the initial Safety Meeting. See Specification Section 01 31 00 – Project Management and Coordination.
- 3. Revise the Site Safety and Health Plan in response to comments including comments generated at the initial Safety Meeting.
- 4. Periodically review the Safety Plan throughout the project and make updates as appropriate and submit updates to the ENGINEER for review.

PART 2 PRODUCTS (NOT USED)**PART 3 EXECUTION (NOT USED)****END OF SECTION**

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Requirements for quality program activities to be performed during the Contract including quality requirements for the following:
 - a. Management Responsibility
 - b. A documented quality control system
 - c. Design Control
 - d. Document Control
 - e. Product Identification and Traceability
 - f. Process Control
 - g. Inspection and Testing
 - h. Inspection, Measuring, and Test Equipment
 - i. Inspection and Test Status
 - j. Nonconformance Reporting
 - k. Corrective action procedures.
 - l. Quality records, including logs, reports and forms.
 - m. Quality audits
 - n. Training
2. Requirements for a Quality Management Plan (QMP)
3. Requirements and qualifications for an independent certified Testing and Inspection Agency and an Approved Agency required by an Authority having Jurisdiction (AHJ).
4. Requirements for an Inspection and Test Plan.
5. Quality requirements for inspection and test procedures, control of measuring and test equipment, and tracking inspection and test status.

B. Related Sections:

1. Section 01 31 00 – Project Management and Coordination
2. Section 01 33 00 – Submittal Procedures
3. Section 01 35 29 – Health Safety and Emergency Response Procedures.
4. Section 01 41 00 – Regulatory Requirements
5. Section 01 50 00 – Temporary Facilities and Controls

1.02 REFERENCES

A. Definitions:

1. Quality Control: Activities, actions, tests and procedures performed before and during execution of the Work to review, check, document and proactively correct errors, to guard against defects and deficiencies and substantiate that on-going activities comply with requirements.

2. Quality Assurance: Validation tests, inspections, procedures, audits and related actions performed during and after execution of the Work to evaluate that actual products incorporated into the Work and the Work results comply with requirements.
3. Witness Point: An identified point in the Work process that the ENGINEER and/or OWNER may review, witness or the inspect method or process of Work.
4. Hold Point: A critical verification point in the Work process beyond which the Work being held cannot proceed without approval of the ENGINEER and/or OWNER.

B. Reference Standards

1. American Society of Testing and Materials (ASTM):
 - a. ASTM E 329, Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
2. International Organization for Standardization (ISO):
 - a. ISO 9001 – Quality Management Systems
 - b. ISO 45001 – Occupational Health and Safety
 - c. ISO 14001 – Environmental Management
3. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910 Occupational Health and Safety Standards
 - b. 29 CFR 1926 Safety and Health Regulations for Construction

1.03 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Conditions and Supplementary Conditions.

B. Qualifications:

1. Superintendent's resume.
 - a. Submit prior to the pre-construction meeting.
2. Safety Representative's resume.
 - a. Submit prior to the pre-construction meeting.
3. Quality Manager's resume.
 - a. Submit prior to the pre-construction meeting.
4. Quality Control Inspection Personnel resumes.
 - a. Submit upon request.

C. Quality Control:

1. Quality Management Plan:
 - a. Submit no less than 30 calendar days before starting any design, fabrication, or field construction Work under this Contract.
2. Principal Construction Staff:
 - a. Submit within 15 days of the Notice to Proceed.
3. Shop and Field Procedures and Instructions
 - a. Submit upon request.
4. Daily Quality Control Reports:
 - a. Submit daily.
5. Inspection and Test Plan.
 - a. Submit no less than 3 weeks before start of construction.

6. Nonconformance Reports.
 - a. Submit prior to the implementation of corrective action.
7. Nonconformance Report Logs.
 - a. Periodically and upon request.
8. Index of Quality Control Records.
 - a. Submit upon request.
9. Quality Audit Plan.
 - a. Submit no less than 1 week before a quality audit
10. Quality Audit Reports.
 - a. Submit no later than 30 days after each audit

D. Certificates:

1. Certificates of Compliance/Certified Material Test Reports
 - a. As defined by the respective specification and prior to incorporation of the item into the Work.

1.04 WITNESS POINT

- A. The ENGINEER will establish witness points and various steps in manufacture and site Work for which the CONTRACTOR shall give prior notification. In addition, the ENGINEER may establish temporary notification points to ensure resolution of temporary quality problems. Witness points require receipt of notification at least 14 calendar days in advance of the scheduled time of performance. The ENGINEER may require that activities performed without proper notification be repeated for the ENGINEER's observation at the CONTRACTOR's expense.
- B. The ENGINEER shall have the right to witness the event; however, if the ENGINEER so authorizes in writing, the CONTRACTOR may proceed without the ENGINEER's presence.
- C. The ENGINEER will establish witness points at the time CONTRACTOR's manufacturing, inspection and test plans and other quality documents are submitted, and as work items are scheduled within the lookahead schedules prepared by the CONTRACTOR as required for the weekly progress meetings (see Specification Section 01 31 00 – Project Management and Coordination).
- D. Witness points may include, but are not limited to:
 1. Temporary video monitoring installation.
 2. Temporary temperature and humidity monitoring installation.
 3. Surface preparation of the existing thimbles and conduits.
 4. Coating of the existing thimbles and conduits.
 5. Existing Gates 5 and 6 removal.
 6. Gates 5 and 6 anchor layout and installation.
 7. Gates 5 and 6 frame, gasket and slide installation.
 8. Gate 3 seal removal and replacement.
 9. Existing HPU removal.
 10. HPU installation.
 11. Control panel electrical and communication connections.

12. Gate pre-testing and testing.
13. Stainless steel cleaning and passivation.
14. Center safety rail installation.

1.05 HOLD POINTS

- A. The ENGINEER will establish hold points and various steps in manufacture and/or site Work for which the CONTRACTOR shall give prior notification and at the time CONTRACTOR's manufacturing plans, schedule, inspection and test plans and other quality documents are submitted and as work items are scheduled within the lookahead schedules prepared by the CONTRACTOR as required for the weekly progress meetings (see Specification Section 01 31 00 - Project Management and Coordination).
- B. Hold points may include but are not limited to witness points.
- C. Hold points require receipt of notification at least ten working days in advance of the scheduled time of performance. The ENGINEER may require that activities performed without proper notification be repeated for the ENGINEER's observation at the CONTRACTOR's expense.
- D. The CONTRACTOR is obligated to advise the ENGINEER and/or OWNER a reasonable time in advance of the operation so that the item may be visually examined, tested, and/or measured by the ENGINEER and/or OWNER to verify conformance with the contract requirements. The CONTRACTOR may not proceed with Work beyond such hold points except by written agreement from Owner.
- E. Hold points are considered to be those tests, inspections, and operations that require mandatory witnessing by the ENGINEER and beyond which operations shall not proceed without the prior written consent of the ENGINEER. The CONTRACTOR's failure to stop at a hold point shall entitle the ENGINEER to reject those items for which timely notification was not provided. Hold points require receipt of notification as may be appropriate for the ENGINEER to arrange for the pending inspection. The ENGINEER shall have the right to require any activities performed without proper notification to be repeated.

1.06 QUALITY ASSURANCE

- A. Qualifications:
 1. Superintendent's Qualifications:
 - a. Employ a Superintendent having a minimum of 5 years of construction- related experience with a minimum of 2 years in supervision or management of construction work and empowered to represent and to act as stipulated in the Contract Documents including General Conditions Article 6.01 – Supervision and Superintendence.
 - b. Prior to the pre-construction meeting, submit the proposed Superintendent's resume showing his or her qualifications and for approval by the OWNER.
 2. Safety Representative's Qualifications:

- a. Employ a Safety Representative having specialized training, certification, and substantial experience in construction safety supervision, including a working knowledge of applicable U.S. Department of Labor (OSHA) regulations, the ability to develop and conduct safety training courses, and familiarity with the industrial hygiene equipment and testing required for the protection of employees.
 - b. The Safety Representative must be acceptable to the ENGINEER, and his performance will be reviewed on a continuing basis; the ENGINEER reserves the right to revoke the approval of the Safety Representative and require a replacement.
 - c. Prior to the pre-construction meeting, submit the proposed Safety Representative's resume showing his name, qualifications, and experience for approval.
 - 3. Quality Manager's Qualifications:
 - a. Employ a Quality Manager having a minimum of 5 years of construction-related Quality Control experience with a minimum of 2 years in supervision or management of Quality Assurance work.
 - b. The Quality Manager must be acceptable to the ENGINEER.
 - c. Prior to the pre-construction meeting, submit the proposed Quality Manager's resume showing his name, qualifications, and experience for approval.
- B. Regulatory Requirements and Reference Standards:
- 1. Codes and Reference Standards:
 - a. Fully comply with the applicable requirements of the codes and reference standards specified or indicated in the Contract Documents. See also Specification Section 01 41 00 – Regulatory Requirements.
 - b. The versions and editions of the codes and reference standards that are applicable to this Contract are as stipulated in the Conditions of the Contract.
 - 1) The applicable versions or editions of the codes and reference standards may not be the most recently published version if the authority having jurisdiction over the Work has adopted some earlier version or edition by regulation, or if newer versions or editions are published after the Contract is awarded
 - 2. Rules, Laws, and Regulations:
 - a. Comply with the applicable federal, state, and local rules, laws, and regulations whether or not such rules, laws, and regulations are specifically identified in the Contract Documents.
 - 1) Federal, state, and local laws and regulations applicable to this Contract are generally stipulated in the Conditions of the Contract; individual Specification Sections; and herein.
 - 2) Governmental Safety Regulations:
 - a) Comply with all applicable U.S. Department of Labor safety regulations, including those stipulated in 29 CFR 1910 and 29 CFR 1926.
 - 3) For the cranes and similar equipment proposed for use in support of construction and capable of encroachment, submit sketches that define the operation of the equipment and calculations demonstrating that the crane capacities are adequate for the loads applied to the ENGINEER.
 - a) Show planned locations and movements of the equipment, the relationship of the equipment footprint to the movement of the crane boom and loads relative to existing structures and surrounding buildings, support grillages

and the protection of existing utilities and facilities, and other pertinent details as required by the ENGINEER.

- b) See also Specification Section 01 50 00 – Temporary Facilities and Controls.
- b. Comply with the applicable rules and regulations of other regulatory bodies having jurisdiction over the Work of this Contract.
- 3. Fees, Royalties, and Taxes:
 - a. Unless specifically indicated otherwise, pay all applicable patent and other fees, royalties, and taxes pertaining to the Work of this Contract.
- 4. Permits and Licenses:
 - a. Unless specifically indicated otherwise, procure and pay for all permits and licenses applicable to the Work of this Contract.

1.07 QUALITY CONTROL

A. General Quality Requirements

- 1. QA Program: The CONTRACTOR shall have in effect at all times a QA Program, which clearly establishes the authority and responsibility of those responsible for the QA Program. Personnel performing quality functions shall have sufficient and well-defined responsibility and authority to enforce quality requirements, to identify, initiate, recommend, and provide solutions to quality problems, and to verify the effectiveness of the solutions. CONTRACTOR shall be responsible to perform all quality assurance and quality control checks in their facilities and in their sub-contractor's facilities.
 - a. Acceptable Certifications:
 - 1) ISO 9001 – Quality Management Systems
 - 2) ISO 45001 – Occupational Health and Safety
 - 3) ISO 14001 – Environmental Management
- 2. CONTRACTOR's responsibilities for Suppliers and Subcontractors: The CONTRACTOR shall identify all applicable quality requirements imposed by these Contract Documents in purchase order documents to its Suppliers and Subcontractors and shall ensure compliance thereto.
- 3. Quality Assurance Interface: The CONTRACTOR shall be subject to audits, inspections and witnessing by the ENGINEER to ensure compliance with the requirements of these Contract Documents. Neither the ENGINEER's exercise of, or failure to exercise, its rights to inspect, witness, or audit, nor any subsequent approval by the ENGINEER shall relieve the CONTRACTOR of its obligation to comply with the terms and conditions of the Contract.
- 4. The CONTRACTOR is responsible for all quality control for this Contract, with the exception of performing those quality control tests or inspections specifically identified as being performed by others.
- 5. Inspections and tests performed by the ENGINEER, 3rd Party Testing Agency, and/or OWNER do not relieve the CONTRACTOR from the responsibility of meeting the specified requirements.
 - a. Inspections and tests performed by the ENGINEER and/or OWNER are not to be considered a guarantee for acceptance of materials that will be delivered subsequent to the time the items were inspected or tested.

6. At no increase in Contract Price, bear the cost for the CONTRACTOR Quality Control program, inspections and tests required in accordance with the Conditions of the Contract.

B. Quality Management Plan (QMP):

1. Before starting the Work of this Contract, develop and implement an approved Quality Management Plan (QMP) for this Contract that incorporates the requirements in this Contract's Specifications.
 - a. Submit the Quality Management Plan (QMP) to the ENGINEER for approval no less than 30 calendar days before starting any design, fabrication, or field construction Work under this Contract.
2. Management Responsibility:
 - a. Define CONTRACTOR's quality policy in the QMP.
 - b. Provide a statement that shows CONTRACTOR's commitment to the quality policy extends to the highest level.
 - c. CONTRACTOR's management must declare and document its commitment to quality within a Quality Policy Statement to be included at the beginning of the QMP.
 - d. In the QMP, show how CONTRACTOR's quality policy extends to all levels of CONTRACTOR's organization.
3. Principle Construction Staff:
 - a. Within 15 days of the Notice to Proceed, submit a list that identifies all of the CONTRACTOR's principle staff assignments, subcontractor's and consultants, and that lists their addresses and other contact information.
 - b. Site Superintendent:
 - 1) Employ a Superintendent with the qualifications specified in Article 1.06.A.1 and who is empowered to represent and to act as stipulated in the Contract Documents including General Conditions Article 6.01 – Supervision and Superintendence.
 - c. Safety Representative
 - 1) Designate an on-site construction Safety Representative who has the qualifications specified in Article 1.06.A.2 to be the safety representative.
 - 2) Empower the Safety Representative with the responsibility for supervising the safety of persons on or about the Work and the property affected by these persons as stipulated in the Contract Documents including General Conditions Article 6.14 – Safety Representative ; and meet the requirements of Specification Section 01 35 29 – Health Safety and Emergency Response Procedures, including notifications and reporting of all on the job injuries.
 - 3) The Safety Representative may not be replaced without written permission from the ENGINEER.
 - d. Quality Control Personnel (Quality Management Representative)
 - 1) Identify those persons responsible for the quality control functions in the QMP; and define in writing the responsibility, authority, and interrelation of those persons.
 - a) Include an Organization Chart detailing the quality control organization and reporting responsibilities.

- b) Identify a Quality Manager and show that their position is independent of the Contractor's construction staff.
 - c) Show the Quality Manager's staff, and clear lines of authority and responsibility for quality management.
- 2) Quality Manager:
 - a) Employ a Quality Manager with the qualifications specified in Subparagraph 1.06.A.3 and empowered with full authority and responsibility to represent the CONTRACTOR on all quality related matters for this Contract.
 - b) Do not assign the Quality Manager and other assigned quality personnel to any other positions under this Contract.
 - c) Set up the Quality Manager position to be independent of the Contractor's construction staff.
 - d) Give the Quality Manager the authority and responsibility for ensuring that the quality policy is communicated, implemented, and maintained.
 - e) At all times that any work is in progress, ensure that the Quality Manager, or their designated substitute, is on the Site and available.
 - f) Delegate responsibility for coordinating inspections and testing to be performed by the Testing and Inspecting Agencies and the OWNER required Approved Agency to the Quality Manager, and empower the Quality Manager with the authority to stop further construction of non-conforming Work pending completion of required corrective action.
 - g) The Quality Manager may not be replaced or substituted without written permission from the ENGINEER.
 - h) The Quality Manager shall not be assigned other work that may interfere with their responsibilities.
- 3) Quality Control Inspections and Test Personnel
 - a) Employ, at a minimum, one qualified Quality Control inspector to be on-site during the installation and testing phase of the Contract.
 - b) Assign or designate additional quality control personnel to perform inspections and test the Work as required.
 - c) Upon request, submit to the ENGINEER for approval resumes showing the names, qualifications, and experience of all quality control personnel that are assigned to the Quality Manager.
 - d) Do not remove or substitute any quality control personnel from their duties on this Contract without prior written notice to the ENGINEER.
 - e) If the CONTRACTOR plans to remove or replace the Quality Manager or other key quality control personnel identified on the organizational chart, notify the ENGINEER in writing before replacing these personnel.
 - f) Submit the resumes of replacements for the Quality Manager and other key quality personnel showing their qualifications for approval.
- 4. Documented Quality Management System:
 - a. Establish and document a quality management system within the Quality Management Plan (QMP) to ensure that Contract quality objectives are satisfied and maintain the quality management system during the life of the Contract.

- b. Develop, implement, and maintain a quality management system consistent with the requirements of this Section and the Conditions of the Contract to assure that the equipment and materials provided conform to the applicable requirements of every Section of the Contract Specifications.
 - c. Provide a quality management System to ensure accuracy and consistency in production, installation, and construction processes by providing documented work instructions where needed to ensure quality.
 - d. Do not begin Work covered by the Quality Management Plan (QMP) until the plan is approved.
 - e. Extend the quality management system requirements to Suppliers and Subcontractors as appropriate.
5. Quality Procedure Development Plan (QPDP):
- a. Establish, implement, and maintain a Quality Procedure Development Plan (QPDP) to develop procedures and instructions for task-specific quality control activities under the Quality Management Plan (QMP).
 - 1) Develop written procedures and instructions for activities affecting quality in design, procurement, manufacturing, and construction activities as applicable to the Work being performed under this Contract.
 - a) This includes but is not limited to Shop and Field Procedures and Instructions.
 - b) Each procedure must contain a statement giving its purpose, scope, applicability, and assigned responsibilities.
 - c) Assign specific responsibilities, and clearly delineate individual job authorities and responsibilities.
 - d) In developing the quality procedures, give consideration to identifying and acquiring any inspection equipment, skills, or special quality processes needed to ensure quality performance.
 - 2) Describe sequential processes to be followed to accomplish quality objectives; and contain references to codes, standards, specifications, and related, interfacing or inspection procedures.
 - a) Prescribe inspection and testing techniques with written procedures and keep them up-to-date.
 - b) If new inspection or testing techniques are being used for construction or manufacturing, allow adequate time to develop appropriate quality procedures for the new techniques.
 - c) Include formats for the quality records needed to ensure that the procedures and instructions are followed and that documentation requirements are understood.
 - 3) Submit Shop and Field Procedures and Instructions when requested by the ENGINEER and/or OWNER.
 - b. Include an index of all procedures and instructions to provide a comprehensive account of the quality controls that are required to implement the Quality Management Plan (QMP).
6. Daily Quality Control Reports:
- a. Prepare Daily Quality Control Reports for each day any Work is performed and which at a minimum identify material deliveries, Work accomplished, tests

conducted, results of inspection and tests, nonconforming work and its disposition, causes of nonconforming work, and corrective actions taken to prevent the recurrence of similar nonconforming work.

- 1) Include Inspection and Test Reports.
- 2) Submit the Daily Quality Control Reports to the ENGINEER for review on a daily basis.

7. Design Control:

- a. Establish appropriate written procedures within the Quality Management Plan (QMP) for identifying, documenting, and reviewing and approving all changes and modifications to the original design.
 - 1) Establish and maintain procedures to control and verify the design of systems in order to ensure that the design criteria, other specified requirements, and requirements of the relevant regulatory agencies are met.
 - 2) Extend this responsibility to those responsible for developing “as-built” documents as part of the design documentation at the end of the Contract, and to construction or manufacturing to ensure compliance with the design requirements.

8. Document Control:

- a. Establish and maintain written procedures for the control of Contract documents and record these procedures within the Quality Management Plan (QMP).
 - 1) Develop document control procedures that provide controls for the drawings, specifications, Contract data, special work instructions, operational procedures, and receipt and transmittal of submittals.
 - 2) Provide procedures for the distribution and storage of documents related to the Contract.
 - a) Promptly eliminate obsolete documents from each work location.
 - b) Retain superseded documents in Contract files, and clearly identify each as such.
 - 3) Examples of the types of Contract documents requiring control include, but are not limited to:
 - a) Contract Drawings.
 - b) Specifications.
 - c) Special work instructions.
 - d) Operational procedures.
 - e) Quality program procedures.
- b. Develop document control measures to assure that all relevant documents are current and available to all users who require them.
 - 1) Develop procedures to ensure that documents are reviewed by the relevant authorized personnel.
 - a) Provide procedures to ensure that changes to documents are reviewed and approved by the same authorized individuals that reviewed and approved the original documents.
 - b) Control changes to Contract documents, and promptly distribute those changes to all required locations together with a master list enumerating the current revisions of each document.

- 2) Develop procedures to assure that all documents required are received and distributed in a timely manner and contain the necessary technical information.
 - a) Distribute and make available copies of documents to all locations needing them to assure that the quality management system functions effectively.
- 9. Purchasing:
 - a. Establish and maintain procedures to assure that purchased services and products conform to specified requirements.
- 10. Product Identification and Traceability:
 - a. Establish and maintain procedures for receiving incoming products, and for final inspection and testing.
 - 1) Specify and implement the procedures for receiving incoming products and for final inspection and testing and document the results of these procedures.
 - a) Conform with the requirements specified in the Conditions of the Contract, and establish material control procedures to ensure that equipment and materials accepted through receiving inspection comply with the procurement documents, and to assure that equipment and materials are properly received, inspected, stored, maintained, installed, and used.
 - 2) Receiving Inspection:
 - a) Implement documented receiving inspection procedures for purchased items such as materials, parts, or equipment delivered.
 - b) Receiving Inspection Records:
 - (1) Develop and maintain Receiving Inspection Records, which at a minimum must include a Receiving Inspection Log containing the following information for each item received:
 - (a) Purchase order number.
 - (b) Item number.
 - (c) Supplier name.
 - (d) Quantity.
 - (e) Item description.
 - (f) Reference to applicable Contract requirements.
 - (g) Date received.
 - (h) Heat number, serial number, or other identification, as applicable.
 - (i) Inspection records for in-transit damage and gross defects.
 - (j) Verification of receipt of all required supporting documentation, including Certificates of Compliance and Certified Material Test Reports, and verification that these documents are traceable to the items received.
 - (k) Acceptability (accept/reject) and nonconformance report number, if applicable.
 - (l) Quality control person's signature and date.
- 11. Process Control:
 - a. Identify and plan the production and installation processes that directly affect quality, and ensure these processes are performed under controlled conditions.
 - 1) Handle, store, and preserve procured items, equipment, and materials from the time of receipt to the time of installation and testing to prevent damage,

- deterioration, distortion of shape or dimension, loss, degradation, loss of identification, or substitution.
- 2) Use special devices, e.g., crates, boxes, containers, dividers, slings, material handling and transportation equipment, and other facilities, for handling material; and ensure that these special devices are maintained and periodically inspected.
 - 3) Provide only new materials for incorporation into the Work except where specified otherwise.
12. Inspection and Testing:
- a. Code-Required Approved Agency for Performing Special Inspections:
 - 1) While code-required special inspection are not anticipated, the CONTRACTOR shall accommodate and comply with any Special Inspections required by TCEQ and/or their designated Code.
 - b. Testing and Inspection Agencies:
 - 1) OWNER may employ the services of one or more additional inspection agencies and certified material testing laboratories, hereafter referred to as the Testing and Inspection Agency or Testing and Inspection Agencies, to perform materials testing, control testing, and inspections of the materials to be incorporated into the Work of this Contract.
 - c. Inspection, Sampling, and Testing:
 - 1) For the duration of this Contract, materials and fabrication procedures will be subject to inspection, sampling, and testing in the mill, shop, and field by the ENGINEER, the Authority Having Jurisdiction (AHJ), the Testing and Inspection Agency or Agencies, and by the code-required Approved Agency (if any) for performing special inspections.
 - a) The ENGINEER and/or the code-required Approved Agency may elect to perform inspections and/or tests of materials at the place of manufacture, the shipping point, or at the destination to verify compliance with applicable Specification requirements.
 - b) Inspections and tests, conducted by persons or agencies other than the CONTRACTOR, do not in any way relieve the CONTRACTOR of responsibility for providing materials and fabrication procedures in compliance with specified requirements and for meeting the requirements of all Specifications and the referenced standards.
 - c) Generally, passing results from both QA and QC tests are required for acceptance of the tested item. Instances where code or a specification details other pass/fail requirements, the respective requirements shall be met.
 - 2) When material furnished or work performed fails to conform to the Contract Documents, the party performing the inspections, is responsible for immediately reporting such deficiency to the ENGINEER and CONTRACTOR.
 - d. Inspection and Test Plan:
 - 1) Develop an Inspection and Test Plan, consistent with the requirements of this Section, to plan inspection and testing procedures as necessary to verify the quality of the Work of this Contract.

- a) Identify all required inspections and tests required by each Specification Section, the Drawings and the Conditions of the Contract, the required frequency of each, the accept/reject criteria of each, records required to document compliance, and the procedures or instruction to be used for control of each activity.
- b) Provide sufficient detail to allow the ENGINEER, OWNER, the Testing and Inspection Agencies, code-required Approved Agency, or any agency having jurisdictional authority over the Work, to coordinate Witness Points and Hold Points for Work items and/or operations to be inspected by the ENGINEER, OWNER, and/or agencies.
- c) Provide written inspection and test procedures that address at a minimum the following:
 - (1) Test prerequisites.
 - (2) Required tools, equipment, and instrumentation.
 - (3) Personnel qualification requirements.
 - (4) Necessary environmental conditions.
 - (5) Acceptance criteria.
 - (6) Nonconformance reporting requirements.
 - (7) Data to be recorded.
 - (8) Test Results reporting forms.
 - (9) Identification of items inspected or tested.
- 2) Submit the Inspection and Test Plan to the ENGINEER for approval no less than 3 weeks before start of construction, and do not commence construction of items requiring inspection or test activities until the ENGINEER's approval of the Inspection and Test Plan is granted.
- 3) Implement and maintain the approved Inspection and Test Plan for the duration of this Contract.
- 4) Prepare records (reports) of inspection and test activities that address at a minimum the following:
 - a) Name of the item(s) inspected/tested.
 - b) Specification reference by Section and Paragraph and, where applicable, revision level or revision date.
 - c) Quantity of items.
 - d) Location of the item(s).
 - e) Inspection/test procedure reference.
 - f) Date of inspection or test activities.
 - g) Name of the inspector/tester.
 - h) Observations/comments of the inspector/tester.
 - i) Specified requirements referenced to the appropriate Specification Section/Paragraph number and if applicable the Drawing sheet number.
 - j) Deviations/non-conformances.
 - k) Corrective action.
 - l) Evaluation of results.
 - m) Acceptability.
 - n) Signature of authorized inspection and test personnel.
- 5) Submit Inspection and Test Reports.

- 6) The Testing and Inspecting Agency, code-required Approved Agency, or an agency having jurisdictional authority over the Work as appropriate, may perform in-process testing and inspection in accordance with the documented procedures reviewed and approved to verify conformance of each item or work activity to the specified requirements.
 - a) Make procedures and instructions readily available to inspection and test personnel at the time and place of the inspection or test.
 - b) When methods of inspection and/or testing are changed, reflect the revisions in methodology in approved written procedures prior to implementing the change on any Work.
 - c) Inspection/test results indicating nonconformance with specified requirements (failure) will be immediately reported to the ENGINEER and CONTRACTOR.
 - d) Both inspections and process monitoring may be performed to ensure that the requirements specified for controlling work processes and the quality of the item are being achieved.
 - e. Certificates of Compliance and Certified Material Test Reports:
 - 1) Materials may be accepted on the basis of a Certificate of Compliance or Certified Material Test Report.
 - 2) Materials accepted on the basis of a Certificate of Compliance may be sampled and inspected/tested at any time.
 - 3) The fact that the materials were accepted on the basis of certification does not relieve the CONTRACTOR of his responsibility to provide materials and equipment that comply with the Specifications.
 - 4) Submit the Certificate of Compliance/Certified Material Test Report, as defined in the technical Specifications, prior to incorporation of the item into the Work.
 - f. Refer to the Conditions of the Contract, for additional testing and inspection requirements.
13. Inspection, Measuring, and Test Equipment (M&TE):
- a. Identify, control, calibrate, and maintain inspection, measuring, and test equipment (M&TE) required to perform inspections, tests, and measurements in order to demonstrate conformance of the Work to the specified requirements.
 - 1) Establish and maintain a system to identify, control, calibrate, and maintain all inspection, measuring, and test equipment prior to its use to demonstrate that construction conforms to the requirements of the Contract Documents.
 - a) Identify each piece of inspection, measuring, and test equipment with a unique identification label permanently and directly affixed to the equipment.
 - b) Affix calibration labels to inspection, measuring, and test equipment that show the date the equipment was last calibrated, and the date recalibration is due.
 - 2) Use only inspection, measuring, and test equipment of the proper type and accuracy for the required measurement, and store and use equipment under suitable environmental conditions.
 - a) Inspections or tests performed using inspection, measuring, and test equipment that is subsequently found to be out-of-tolerance, or that is

damaged during use, or that is lost are considered nonconforming until all characteristics previously inspected or tested using the equipment have been reassessed and re-verified as correct, re-inspected, or re-tested as necessary.

(1) A nonconformance report for out-of-tolerance or damaged inspection, measuring, and test equipment must be processed in accordance with the requirements of Nonconformance Reporting as specified in Article 1.07.B.15.

b) Make provisions for the recalibration of inspection, measuring, and test equipment in a timely manner.

(1) Either the CONTRACTOR or an agency/vendor must perform and document the calibration of inspection, measuring, and test equipment using calibration standards traceable to the National Institute of Standards and Technology (NIST), and the calibrations must be performed at the intervals specified in the calibration procedures to assure the accuracy of inspection, measuring, and test equipment.

(a) NIST information is accessible at www.nist.gov.

(2) In the event that no national standards exist for the calibration of an item of inspection, measuring, and test equipment, document the basis used for the calibration of the item.

(3) Recall and recalibrate inspection, measuring, and test equipment at pre-prescribed intervals, and maintain records of calibration performed.

14. Inspection and Test Status:

a. Provide a means for identifying the inspection and test status of work during its production and installation.

1) Maintain the inspection and test status of the work by means of marking, stamps, tags, labels, routing cards, inspection records, test software, physical location, or other suitable means.

2) Status identification must indicate the conformance or nonconformance of each item with regard to inspections and tests performed.

b. Establish controls to assure that only work that has passed the required inspections and tests are accepted.

1) Record the status of completed, tested, and inspected items or construction work in Daily Quality Control Reports.

2) Document nonconforming items or construction work in nonconformance reports that are issued in accordance with the requirements for nonconformance reporting specified in Article 1.07.B.15.

15. Nonconformance Reporting:

a. A nonconformance exists when material furnished or work performed does not comply with the requirements of the Contract Drawings, Specifications, codes, standards, or any other Contract requirements; and such nonconforming work is therefore considered defective.

1) Nonconforming work also exists when either material or equipment exhibits a deficiency in physical inspection, test characteristics, or documentation.

- b. Establish and maintain documented procedures to identify and control nonconforming work in order to ensure that only conforming Work is used for construction.
 - 1) Identification of nonconforming work is the responsibility of the CONTRACTOR.
 - 2) The CONTRACTOR is also responsible for documenting and addressing nonconforming work in accordance with the Contract Documents that is identified by the ENGINEER and/or OWNER.
 - 3) Establish written procedures to define the methods and responsibilities for the identification, documentation, control, and processing of nonconforming equipment and material.
 - 4) Apply this system for identifying and controlling nonconforming work to the actions associated with installation and construction, and to all material and equipment that, for any reason, fails to conform to the Specifications or other applicable and approved product descriptions.
 - a) Develop a mode of operation that emphasizes the identification, correction, and prevention of nonconforming work.
 - 5) The quality control personnel have the authority to stop that portion of the work that does not comply with the Contract requirements.
- c. Nonconformance Procedure:
 - 1) Comply with the requirements regarding nonconforming and defective work in the Conditions of the Contract, and with the requirements for nonconforming Work specified in this Section.
 - 2) To identify and prevent the use of nonconforming items/materials, develop nonconformance procedures that address and include the following:
 - a) Definition of “nonconformance”.
 - b) Methods of identifying non-conformances.
 - c) Nonconformance reporting requirements that include immediate verbal notification followed by submission of a written Nonconformance Report.
 - d) Application and removal of nonconformance status tags.
 - e) Evaluations/recommendations.
 - f) Physical segregation, removal from the Site, or reassignment of nonconforming items to lesser applications.
 - g) Nonconformance items to be reassigned to lesser applications must be previously approved for the new application.
 - h) Cause of non-conformance.
 - i) Corrective action to be taken.
 - 3) Nonconformance Report Log:
 - a) Develop, maintain, and submit periodically and upon request a Nonconformance Report Log to the ENGINEER that contains the following information, at a minimum, to enable tracking of all Nonconformance Reports:
 - (1) Sequential, unique nonconformance report number.
 - (2) Date issued.
 - (3) Originator.
 - (4) System affected/drawing number/serial number.

- (5) Brief description of the nonconformance and its source (e.g. Supplier, Subcontractor, welder).
 - (6) Recommended and approved disposition.
 - (7) Verification of corrective action.
 - (8) Date closed.
 - (9) Quality Manager's initials.
 - (10) Remarks, as applicable.
 - b) The disposition of all Nonconformance Reports must conform to the requirements of the required corrective action as specified in Article 1.07.B.16.
16. Corrective Action:
- a. The resolution of nonconforming item/material issues must be approved by the ENGINEER with input from the CONTRACTOR's project management and quality personnel.
 - b. Certain non-conforming items may also require the review and approval of Texas Commission on Environmental Quality.
 - 1) Assign corrective action dispositions to Nonconformance Reports as follows:
 - a) REPAIR – Nonconforming items or work that are restored to a conforming condition by alternative means.
 - b) REWORK – Nonconforming items or work that are restored through additional normal processing.
 - c) USE-AS-IS – Nonconforming items or work that are to be used in its current condition.
 - d) SCRAP – Nonconforming items that do not meet requirements and cannot be practically assigned REWORK or REPAIR dispositions to meet requirements.
 - 2) Re-inspect items having Nonconformance Reports assigned either a REPAIR or REWORK disposition in accordance with the original requirements.
 - 3) Submit Nonconformance Reports with dispositions of REPAIR or USE-AS-IS to the ENGINEER for approval prior to the implementation of corrective action.
 - a) OWNER may seek compensation for items assigned either a REPAIR or USE-AS-IS disposition.
 - 4) Immediately segregate items assigned a SCRAP disposition from conforming material, and remove them from the Site within 24 hours of assigning a SCRAP disposition, as practicable.
 - c. Establish and maintain written procedures of investigating the cause of nonconforming work and for the corrective action needed to prevent recurrence of nonconforming work.
 - 1) Investigate the root cause of nonconforming conditions and take the corrective actions needed to prevent recurrence.
 - 2) Ensure that corrective actions are completed in a timely fashion and that they are effective.
 - 3) Provide measures for analyzing processes to detect and eliminate potential causes of nonconforming work.

- 4) Initiate preventative actions to deal with problems at a level corresponding to the risks encountered.
 - 5) Include measures for implementing and recording changes in procedures resulting from corrective action.
17. Quality Records:
- a. Establish and maintain written procedures for quality records to identify which records are to be kept; responsibility for their production and collection; and responsibility for indexing, filing, storage, maintenance, and disposition of quality records.
 - 1) Identify every type of quality record to be generated as a result of implementing the CQMP and specify the retention time for each.
 - 2) Quality records requiring control include, but are not limited to:
 - a) Inspection Reports.
 - b) Test Data.
 - c) Certification Records.
 - d) Personnel Qualifications.
 - e) Submittals, Value Engineering Change Proposals (VECP), Change Orders, and Requests for Interpretation/Information (RFI).
 - f) Calibration Records.
 - g) Nonconformance Reports.
 - h) Corrective Action Reports.
 - i) Quality Audit Reports.
 - 3) Include Supplier, CONTRACTOR and Subcontractor quality records.
 - 4) Ensure that a level of authority commensurate with the nature of the quality records verifies the adequacy of records on a systematic basis.
 - b. Index, file, and maintain all quality records in a manner that provides for timely retrieval, traceability to, identification with, and acceptability of, material, equipment and systems.
 - 1) Quality records must be legible and specify the work involved.
 - 2) Only complete, legible, and properly authenticated documents can be considered quality records.
 - 3) Maintain quality records to provide objective evidence that all activities conform to the CQMP requirements specified, to show that the quality management system is properly functioning, and to document the basis of decisions.
 - 4) Maintain quality records in a manner that minimizes deterioration and damage.
 - 5) Index of Quality Control Records:
 - a) Prepare and submit upon request an index of all quality control records that will be accumulated and maintained during the progress of the Work.
 - c. Make quality records available upon request.
18. Quality Records Retention
- a. Retention time for all quality records will be not less than 3 years after the date of Final Acceptance, except as modified below.
 - 1) Sample retention:
 - a) In addition to the Sample requirements of Section 01 33 00 - Submittal Procedures, retain all Samples of materials, products, or assemblies to be

incorporated into the Work for a minimum period of 1 year after the date of the Certificate of Substantial Completion.

- b. No quality assurance records shall be destroyed or otherwise disposed of without prior written permission from the ENGINEER and OWNER.
- c. After the 3-year period, provide 30 days' notice of intent to discard or destroy quality records, including Samples as may be in the possession of the CONTRACTOR or his Subcontractors, subsequent to this retention time.
 - 1) At or before the expiration of the 3-year period, the ENGINEER and/or OWNER shall be provided the option of receipt and/or retention of all quality assurance records.

19. Quality Audits:

- a. Establish and implement written procedures for the performance of internal quality audits to assure that the elements of the quality management system are functioning as intended.
 - 1) Quality audits are not the same as financial audits.
- b. Quality Audit Schedule:
 - 1) Establish a Quality Audit Schedule denoting the locations, organizations to be audited, topics, and scheduled dates.
 - 2) Schedule audits based upon the status and importance of the activity being audited.
 - a) At a minimum, perform audits at 90-day intervals or as necessary to verify that all elements of the Quality Management System are functioning as intended.
 - 3) Update the audit schedule at 90-day intervals beginning on the date of approval of the initial schedule by the ENGINEER.
- c. Quality Audit Plan:
 - 1) Prepare and submit a Quality Audit Plans for each audit.
 - a) Address the audit scope, location, and dates.
 - b) Include the audit checklists to be used.
 - c) Submit the Quality Audit Plan no less than 1 week before a quality audit.
- d. Quality Audit Procedure:
 - 1) Perform scheduled internal audits to verify that quality procedures are being enforced and are functioning as intended to ensure total compliance with the Specifications, Contract Drawings, and all reference standards.
 - 2) Conduct Audit Entrance Meetings with the audited organization's responsible management personnel.
 - 3) Use procedures, standards, and audit checklists to assure substantive audit results.
 - 4) Identify records examined, activities witnessed, and personnel interviewed during the audit.
 - 5) Thoroughly investigate problems and clarify misunderstandings during the course of the audit.
 - 6) Document quality problems uncovered in Audit Finding Reports.
 - 7) Conduct Audit Exit Meetings with responsible personnel; and discuss audit results, problems noted, required corrective action, and schedules for completion of corrective actions.

- e. Quality Audit Personnel:
 - 1) Use qualified personnel having no direct responsibilities in the area audited.
 - 2) Document the basis of audit personnel qualification.
 - f. Quality Audit Reports:
 - 1) Document audit results within a Quality Audit Report.
 - a) Report areas/topics audited.
 - b) Identify the audited organization and report any problems found.
 - c) Address the root causes that led to any nonconforming conditions and recommend actions to prevent recurrence of the nonconformance.
 - 2) Distribute Quality Audit Reports and Audit Finding Reports to personnel having responsibility for the areas audited within 10 working days following the completion of the audit.
 - 3) Submit all Quality Audit Reports for approval no later than 30 days after each audit.
 - 4) Maintain records of quality audits as quality records, and make them available upon request.
 - g. Quality Audit Follow-Up:
 - 1) Assure that responses to Audit Finding Reports are complete and accurate.
 - 2) Track and verify corrective action, and close problem reports resulting from audits in a timely fashion.
 - 3) Re-audit deficiency areas on an accelerated basis to verify effectiveness of corrective action and actions to preclude recurrence of problems.
 - h. OWNER Audits:
 - 1) Quality audits of CONTRACTOR, Subcontractor, and Supplier activities may be performed by the OWNER's representatives to verify compliance with the Specifications and referenced standards.
 - 2) Upon notice, provide timely access to facilities, locations, records, and personnel by the OWNER's auditors to facilitate performing audits.
 - 3) Assure cooperation with the OWNER auditors by all Contract personnel.
 - 4) Provide timely and thorough responses to identified quality problems.
20. Training:
- a. Establish and maintain documented procedures for identifying training needs and to provide for the training of all personnel supervising construction activities.
 - 1) Training must include, but not be limited to, procedures to identify potential quality problems in either the Work or materials; and must include appropriate direction for identifying, reporting, and resolving quality problems.
 - 2) Train the quality control personnel so they are qualified for their assigned quality tasks based on having the appropriate education, training, or experience required.
 - 3) Develop and maintain a training matrix of supervisors that lists the following:
 - a) Project personnel by title.
 - b) Include consultant, CONTRACTOR, and Subcontractor personnel.
 - c) Applicable procedures, standards, specifications, or other training materials.
 - d) Type of training (classroom or required reading).

1.08 SITE SAMPLES AND MOCK-UPS:

- A. When specified, provide Samples and mock-ups that illustrate functional and aesthetic characteristics similar in every way to the actual materials or equipment to be incorporated into the work.
 - 1. Provide office Samples of sizes and quantities that clearly illustrate the full color range and functional characteristics of products and materials, including attachment devices.
- B. Furnish Site Samples and erect mock-ups at the Site as specified in individual Specification Sections, and as may be necessitated by the submitted value engineering proposals, at locations acceptable to the ENGINEER.
 - 1. Do not incorporate the Sample or mock-up material or equipment into the Work until approval to do so is received.

1.09 MANUFACTURER'S CERTIFICATES

- A. When specified in individual Specification sections, submit certificate of compliance prior to shipment of material or equipment. CONTRACTOR's representative officially responsible for assuring that all requirements of these Contract Documents are met shall sign the Certification of Compliance.
- B. Certificate of Compliance shall be signed by Manufacturer and/or CONTRACTOR certifying that material or equipment specified conforms to or exceeds the requirements of the Specifications. Attach supporting quality documentation and reference data as appropriate.
- C. Material or equipment used on the basis of a Certification of Compliance may be sampled and tested at any time. The fact that material or equipment is used on the basis of a Certification of Compliance shall not relieve CONTRACTOR of responsibility for incorporating material or equipment in the Work which conforms to requirements of the Contract Documents. Material or equipment not conforming to such requirements will be subject to rejection whether in-place or not.
- D. ENGINEER reserves the right to refuse permission for use of material or equipment on the basis of a Certification of Compliance.

PART 2 PRODUCTS (NOT USED)**PART 3 EXECUTION (NOT USED)****END OF SECTION**

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 01 41 00
REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. General requirements for regulatory requirements pertaining to the Work and is supplementary to all other regulatory requirements mentioned or referenced elsewhere in the Contract Documents.
- B. At all times, observe and comply with all Laws and Regulations which in any manner limit, control, or apply to the actions or operations of the CONTRACTOR, their Subcontractor(s), or their employees, agents or servants, engaged in performance of the Work.
- C. Perform Work in a manner that is consistent with any and all Technical Standards and/or other standards required in the Contract Documents.
- D. Related Sections
 - 1. Section 01 32 00 – Construction Progress Documentation
 - 2. Section 01 35 29 – Health Safety and Emergency Response Procedures

1.02 REFERENCES

- A. Definitions
 - 1. Aquatic Resource Relocation Plan (ARRP): Plan submitted to the Texas Parks and Wildlife Department (TPWD) prior to dewatering, maintenance, and construction related activities in rivers, creeks, streams, lakes, sloughs, reservoirs, bays, estuaries, stilling basins, and other flood control structures may negatively impact fish, shellfish, and other aquatic resources. The ARRP articulates how negative impacts to aquatic organisms from dewatering, maintenance, and construction related activities will be controlled and limited.
 - 2. Asbestos: The asbestiform varieties of serpentine (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite, anthophyllite, and actinolite-tremolite.
 - 3. Asbestos Containing Material (ACM):
 - a. Category I Nonfriable Asbestos-Containing Material: Asbestos-containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than 1 percent asbestos as determined using the Polarized Light Microscopy method specified in Appendix E of 40 CFR 63.
 - b. Category II Nonfriable Asbestos-Containing Material: Any material, excluding Category I nonfriable asbestos-containing material, containing more than 1 percent asbestos as determined using the Polarized Light Microscopy method specified in Appendix E of 40 CFR 63, that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

4. Authority Having Jurisdiction (AHJ): Building Code officials, zoning officials, inspectors, and government and regulatory agencies given the authority to protect the public's health, safety, and welfare.
5. Friable: Material that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.
6. Friable Asbestos Material: Material containing more than 1 percent asbestos as determined using the Polarized Light Microscopy method specified in Appendix E of 40 CFR 63.
7. Permit to Introduce Fish, Shellfish, or Aquatic Plants into Public Waters: A Texas Parks and Wildlife Permit (TPWD) required to relocate fish and other aquatic organisms from the stilling basin of the reservoir to either the lake or the river.
8. Polychlorinated Biphenyls (PCBs): Any chemical substance that is limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances which contains such substance, including, but are not limited to: dielectric fluids; solvents; oils; waste oils; heat transfer fluids; hydraulic fluids; paints or coatings; sludges; slurries; sediments; dredge spoils; soils; materials containing PCBs as a result of spills; and other chemical substances or combinations of substances, including impurities and byproducts and any byproduct, intermediate, or impurity manufactured at any point in a process.
9. Regulated Asbestos Containing Material (RACM): Any of the following categories of asbestos:
 - a. Friable asbestos material.
 - b. Category I nonfriable asbestos containing material (ACM) that has become friable.
 - c. Category I nonfriable asbestos containing material (ACM) that will be or has been subjected to sanding, grinding, cutting, or abrading.
 - d. Category II nonfriable asbestos containing material (ACM) that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on it during regulated demolition or renovation operations.
10. Right-of Way: Land expressly reserved for vehicle/pedestrian traffic or utilities.
11. Sherds: Ceramic fragments.
12. Volatile Organic Compounds (VOC): Generally meant to refer to organic chemical compounds having high enough vapor pressures under normal conditions to significantly vaporize and enter the atmosphere.
 - a. The U.S. Environmental Protection Agency has composed the following definition for regulatory, not necessarily scientific, purposes: "VOC means any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions (and then lists several other exemptions)."

B. Reference Standards:

1. State of Texas:
 - a. Texas Commission on Environmental Quality (TCEQ):
 - b. Texas Health and Safety Code:

- c. Texas Administrative Code, Title 31 - Natural Resources and Conservation, Chapter 57 - Fisheries
- 2. United States Government:
 - a. Occupational Safety and Health Administration (OSHA):
 - 1) 29 CFR 1910 - Occupational Health and Safety Standards.
 - 2) 29 CFR 1926 - Safety and Health Regulations for Construction.
 - b. Environmental Protection Agency (EPA):
 - 1) 40 CFR 61 National Emission Standards for Hazardous Air Pollutants.
 - 2) 40 CFR 63 National Emission Standards for Hazardous Air Pollutants. for Source Categories.
 - 3) 40 CFR 112 Oil Pollution Prevention.
 - 4) 40 CFR 761 Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions.
 - c. United States Code (U.S.C.):
 - 1) 15 U.S.C. Section 2601 et seq.
 - a) Federal Toxic Substances Control Act, Public Law 99-519, as amended.
 - 2) 33 U.S.C. Section 1251 et seq.
 - a) Water Quality Act of 1987, Public Law 100-4.
 - b) Clean Water Act of 1977, Public Law 95-217.
 - c) Federal Water Pollution Control Act Amendments of 1972, Public Law 95-500.
 - 3) 42 U.S.C. Section 6901 et seq.
 - a) Resource Conservation and Recovery Act (RCRA), Public Law 94-580.
 - 4) 42 U.S.C. Section 7401 et seq.
 - a) Clean Air Act, as amended by Public Law 101-549, 104 Stat. 2399.95-95.

1.03 QUALITY ASSURANCE

- A. All work is governed at all times by the applicable provisions of Federal, State, and Local Laws, Codes, and Regulations.
- B. Monitor and document daily compliance and performance of the requirements set forth in this Section consistent with the Local, State, and Federal rules and regulations.
- C. Occupational Safety and Health Administration (OSHA):
 - 1. Comply with applicable Occupational Safety and Health Administration (OSHA) rules and regulations as specified in 29 CFR 1910 Occupational Health and Safety Standards and 29 CFR 1926 Safety and Health Regulations for Construction.
- D. Environmental Protection Agency (EPA):
 - 1. Comply with the following Laws, Codes, and Regulations pertaining to the work being performed:
 - a. National Emission Standards for Hazardous Air Pollutants.
 - b. Federal Toxic Substances Control Act.

- c. Water Quality Act of 1987.
 - d. Clean Water Act of 1977.
 - e. Federal Water Pollution Control Act Amendments of 1972.
 - f. Resource Conservation and Recovery Act (RCRA).
 - g. Clean Air Act.
 - h. Toxic Substance Control Act, P.L. 94-469 (TSCA) (15 U.S.C. §2601, et seq.).
 - 1) Do not use toxic chemical substances, mixtures, equipment, containers, sealants, coatings, or dust-control agents except in accordance with all provisions of the Toxic Substances Control Act (TSCA) as interpreted by the rules and regulations of 40 CFR 761 for polychlorinated biphenyls (PCBs).
 - 2) Immediately report in writing any toxic chemical substance, mixture, equipment, container, sealant, coating, or dust-control agent found stored within the Project area and stop work in the area until arrangements for the removal of the toxic materials have been made, after which the Contractor may continue to work in the area.
2. Hazardous Air Pollution Control:
- a. The United States Environmental Protection Agency (EPA) has delegated implementation and enforcement of the National Emission Standards for Hazardous Air Pollutants (NESHAPs) codified in 40 CFR 61 and 40 CFR.
 - 1) If the building or structure to be demolished or renovated has not been inspected by an AHERA-certified building inspector during the past year, have the building or structure to be demolished or renovated inspected by a currently AHERA-certified building inspector.
 - 2) In either case, obtain a copy of the inspection report to determine if asbestos is present; and, if so, to determine the amount of friable asbestos containing material (ACM) present.
 - 3) If the combined amount of regulated asbestos containing material (RACM) present is at least 260 linear feet on pipes, or 160 square feet on other facility components, or 35 cubic feet off facility components where the length or area could not be measured; then it is regulated asbestos and must be removed by a certified contractor prior to any other disturbance activity.
 - 4) Submit a copy of the Asbestos Inspection Report prepared by the currently AHERA-certified building inspector to the ENGINEER for information.
- E. Texas Parks and Wildlife Department (TPWD):
- 1. Comply with the following Laws and Regulations pertaining to the work being performed:
 - a. 31 TAC §57 – Fisheries.
 - 2. At a minimum of 45-days prior to the start of dewatering the low flow outlet bay, assist OWNER's staff with completing the Aquatic Resource Relocation Plan (AARP) and the application for the Permit to Introduce Fish, Shellfish, or Aquatic Plants into Public Waters.
 - 3. Do not begin dewatering the low flow outlet bay prior to being informed by OWNER's staff that written approval of the AARP has been received from

TPWD and the Permit to Introduce Fish, Shellfish, or Aquatic Plants into Public Waters has been issued by TPWD.

4. Coordinate date to start dewatering with OWNER's environmental staff.
5. If requested by the OWNER, provide staff to assist OWNER's staff with aquatic resource relocation during the dewatering process.
6. Incorporate TPWD permit and coordination efforts into the construction schedule and updates required by Specification Section 01 32 00 – Construction Progress Documentation.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 01 42 16

REFERENCES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. General definitions, terminology and references for the General Conditions, the Supplementary Conditions, and the Project.

1.02 REFERENCES

A. Definitions:

1. *Addenda* – Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the Contract Documents.
2. *Agreement* – The written instrument which is evidence of the agreement between OWNER and CONTRACTOR covering the Work.
3. *Application for Payment* – The form acceptable to OWNER and 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. *Asbestos* – Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
5. *Bid* – The offer or proposal of a bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
6. *Bidding Documents* – The Bidding Requirements and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).
7. *Bidding Requirements* – The Advertisement or Invitation to Bid, Instructions to Bidders, Bid security form, if any, and the Bid Form with any supplements.
8. *Bonds* – Performance and payment bonds and other instruments of security, such as warranty bonds, if applicable.
9. *Certificate of Final Completion* – A certificate issued by the ENGINEER, after review and approval by ENGINEER to the CONTRACTOR certifying that all of the conditions of Final Completion have been met and the requirements to receive approval of the Final Application for Payment achieved, in accordance with the Contract Documents and to the satisfaction of OWNER. Once the Certificate of Final Completion has been issued by the ENGINEER, final payment shall be due and payable and all applicable warranties on the Work shall commence. To receive this certificate, the CONTRACTOR must submit in writing to the ENGINEER the CONTRACTOR's Final Application for Payment.
10. *Certificate of Substantial Completion* – A certificate issued by the ENGINEER, after review and approval by ENGINEER to the CONTRACTOR certifying that

all the conditions of Substantial Completion have been met in accordance with the Contract Documents and to the satisfaction of OWNER.

11. *Change Order* – An executed agreement between ENGINEER, CONTRACTOR and OWNER required for any of the following: changes in Drawings and Specifications necessary after the performance of the Work has commenced; changes which increase and/or decrease the Contract Price and/or Cost of Work; changes which increase or decrease Contract Times; changes which impact the anticipated service life of the Work; and/or changes that significantly impact operation and maintenance, issued on or after the Effective Date of the Agreement.
12. *Claim* – A demand or assertion by OWNER or CONTRACTOR seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
13. *Contract* – The entire and integrated written agreement between the OWNER and CONTRACTOR concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.
14. *Contract Documents* – The Contract Documents establish the rights and obligations of the parties and include the Agreement, Addenda (which pertain to the Contract Documents), CONTRACTOR's Bid (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Notice to Proceed, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all Written Amendments, Change Orders, Field Orders, and ENGINEER's written interpretations and clarifications issued on or after the Effective Date of the Agreement. Approved Shop Drawings and the reports and drawings of subsurface and physical conditions are not Contract Documents. Only printed or hard copies of the items listed in this paragraph are Contract Documents. Files in electronic media format of text, data, graphics, and the like that may be furnished by OWNER to CONTRACTOR are not Contract Documents.
15. *Contract Price* – The moneys payable by OWNER to CONTRACTOR for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of paragraph 11.03 in the case of Unit Price Work).
16. *Contract Times* – The number of days or the dates stated in the Agreement to: (i) achieve Substantial Completion; and (ii) complete the Work so that it is ready for final payment as evidenced by ENGINEER's written recommendation of final payment.
17. *CONTRACTOR* – The individual or entity with whom OWNER has entered into the Agreement.
18. *Cost of the Work* – See paragraph 11.01.A for definition.
19. *Day* – The word "day" shall constitute a calendar day of 24 hours measured from midnight to the next midnight.

20. *Defective* – The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it does not conform to the Contract Documents or does not meet the requirements of any inspection, reference standard, test, or approval referred to in the Contract Documents, or 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 14.04 or 14.05).
21. *Drawings* – that part of the Contract Documents prepared or approved by ENGINEER which graphically shows the scope, extent, and character of the Work to be performed by CONTRACTOR. Shop Drawings and other CONTRACTOR submittals are not Drawings as so defined.
22. *Effective Date of the Agreement* – The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
23. *ENGINEER* – This term shall mean Gannett Fleming, Inc. or its designated representative and shall include any individual or entity having a contract with ENGINEER to furnish services as ENGINEER’s independent professional associate or consultant with respect to the Project.
24. *Field Order* – written agreement, by and between ENGINEER, CONTRACTOR and OWNER, required for any changes which do not rise to the level of a Change Order as defined herein, and issued on or after the Effective Date of the Agreement.
25. *Final Application for Payment* – the Application for Payment requested once the CONTRACTOR believes the Work has reached Final Completion. The Final Application for Payment shall include all supporting documentation required in the Contract Documents.
26. *Final Completion* – The time at which: 1) all Work, in the opinion of the ENGINEER (such opinion to be subject to the concurrence of the OWNER), has been satisfactorily completed in accordance with any and all requirements of the Contract Documents, including completion of all corrections and/or modifications identified during Final Inspection; 2) all Project closeout documentation has been submitted, reviewed and approved, in accordance with provisions and requirements of the Contract Documents; 3) any and all other obligations of the CONTRACTOR that must be completed prior to Final Completion have been satisfactorily completed; 4) and a Certificate of Final Completion has been issued.
27. *Final Inspection* – A scheduled inspection, conducted by the ENGINEER, CONTRACTOR, and OWNER, to determine whether all Work performed under this Project has been successfully completed in accordance with the Contract Documents. Final Inspection shall include all required re-inspections necessary due to incomplete, non-conforming, unacceptable and/or defective Work.
28. *Furnish* – 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.

29. *Furnish, Install, Perform/Provide* – When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of CONTRACTOR, “provide” is implied.
30. *General Conditions* – These Standard General Conditions.
31. *Hazardous Environmental Condition* – The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.
32. *Hazardous Waste* – The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
33. *Install* – 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.
34. *Laws and Regulations; Laws or Regulations* – Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
35. *Liens* – Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
36. *Milestone* – A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
37. *Notice of Award* – The written notice by OWNER to the apparent successful bidder stating that upon timely compliance by the apparent successful bidder with the conditions precedent listed therein, OWNER will sign and deliver the Agreement.
38. *Notice to Proceed* – A written notice given 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 under the Contract Documents.
39. *OWNER* – The individual, entity, public body, or authority with whom CONTRACTOR has entered into the Agreement and for whom the Work is to be performed.
40. *Partial Utilization* – Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.
41. *PCBs* – Polychlorinated biphenyls.
42. *Perform/Provide* – 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.
43. *Petroleum* – Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

44. *Project* – The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part as may be indicated elsewhere in the Contract Documents.
45. *Project Manual* – The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
46. *Proposed Contract Modification (PCM)* – A requested deviation from the Contract Documents, including, but not limited to, substitutes and/or “or equals”, proposed by CONTRACTOR, ENGINEER or OWNER, which must be submitted in writing to all parties for approval. In the event the PCM meets the requisites for a Change Order and is agreed to by all the parties, a Change Order will be issued authorizing the change.
47. *Radioactive Material* – Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
48. *Request for Interpretation (RFI)* – A written request by CONTRACTOR for an interpretation of any Drawings, Specifications, Samples, Shop Drawings or other Contract Documents from the ENGINEER related to the Work. CONTRACTOR shall provide copies of all RFIs to both ENGINEER and OWNER.
49. *Resident Project Representative (RPR)* – An authorized third-party representative retained by OWNER who may be assigned to the Site or any part thereof.
50. *Samples* – Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
51. *Shop Drawings* – All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for CONTRACTOR and submitted by CONTRACTOR to illustrate some portion of the Work.
52. *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 for access thereto, and such other lands furnished by OWNER which are designated for the use of CONTRACTOR.
53. *Specifications* – That part of the Contract Documents consisting of written technical descriptions of materials, equipment, systems, standards, and workmanship as applied to the Work and certain administrative details applicable thereto.
54. *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 at the Site.
55. *Submittals* – All Drawings, Shop Drawings, Specifications, PCMs, Requests for Interpretations, or any other document required to be submitted in writing to the ENGINEER by the CONTRACTOR. An Application for Payment shall not be considered a Submittal.
56. *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.

57. *Supplementary Conditions* – That part of the Contract Documents which amends or supplements these General Conditions.
58. *Supplier* – A manufacturer, fabricator, 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 any Subcontractor.
59. *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 those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
60. *Unit Price Work* – Work to be paid for on the basis of unit prices.
61. *Work* – The entire completed 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, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
62. *Written Amendment* – A written statement modifying the Contract Documents, signed by OWNER and CONTRACTOR on or after the Effective Date of the Agreement and normally dealing with the non-engineering or nontechnical rather than strictly construction related aspects of the Contract Documents.
63. *Intent of Certain Terms or Adjectives*:
 - a. Whenever in the Contract Documents the terms “as allowed,” “as approved,” or terms of like effect or import are used, or 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 action or determination will be solely to evaluate, in general, the completed Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed 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 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 paragraph 9.10 or any other provision of the Contract Documents.
 - b. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

B. Specification Terminology

1. "Indicated" means graphic representations, notes, or schedules on drawings, or other requirements in Contract Documents. Words such as "shown", "noted", "scheduled", are used to help locate the reference. No limitation on the location is intended unless specifically noted.
2. "Installer" means an entity engaged by CONTRACTOR, either as an employee, subcontractor, or sub-subcontractor to install materials and/or equipment. Installers are to have successfully completed a minimum of five Projects similar in size and scope to this Project, have a minimum of five years of experience in the installation of similar materials and equipment, and comply with the requirements of the authority having jurisdiction.
3. "Manufacturer" means an entity engaged by CONTRACTOR, as a subcontractor, or sub-subcontractor to furnish materials and/or equipment. Manufacturers are to have a minimum of five years' experience in the manufacture of materials and equipment similar in size, capacity and scope to the specified materials and equipment.
4. "Testing laboratory" means an independent entity engaged to perform specific inspections or tests, either at the Site or elsewhere, and to report and interpret the results of those inspections or tests.
5. "Listed" used in the context with equipment means the equipment is included in a list published by a nationally recognized laboratory which makes periodic inspection of production of such equipment and states that such equipment meets nationally recognized standards or has been tested and found safe for use in a specified manner.
6. "Labeled" used in the context with equipment means the equipment has a valid label, symbol, or other identifying mark of a nationally recognized testing laboratory such as Underwriters Laboratories, Inc., and production is periodically inspected in accordance with nationally recognized standards or tests to determine safe use in a specified manner.
7. "Certified" used in context with materials and equipment means the material and equipment has been tested and found by a nationally recognized testing laboratory to meet specification requirements, or nationally recognized standards if requirements are not specified, and is safe for use in the specified manner. Production of the equipment must be periodically inspected by a nationally recognized testing laboratory and the equipment must bear a label, tag, or other record of certification.
8. "Certified" used in context with labor performance or ability to install materials and equipment means that the abilities of the proposed installer have been tested by a representative of the specified testing agency authorized to issue certificates of competency and has met the prescribed standards for certification.
9. "Certified" used in context with test reports, payment requests or other statements of fact means that the statements made on the document are a true statement as attested to by the certifying entity.
10. "Certificates": CONTRACTOR or manufacturer prepared written instruments certifying product compliance with the Contract Documents. The written

instruments shall include test records or reports, and such other types of certificates as required by the Specifications

11. "Product Data": Manufacturer's descriptive literature, product specifications, performance and capacity rating schedules, published details, and installation instructions.
12. "Shop Drawings": CONTRACTOR or manufacturer prepared, completely dimensioned and annotated detail drawings of the products presented.
13. "Samples": CONTRACTOR or manufacturer prepared and delivered physical samples as requested in the various Specifications Sections.
14. "Other Submittals": Other submittals include, but are not limited to, other technical documents, operation and maintenance documents, installation procedures, Work plans, field data, training documents, and other required submittals.
15. "Technical Standards" – means any and all standards, specifications, manuals, or codes of any technical society, organization, or association, and/or Laws and Regulations applicable to the Work to be performed by the CONTRACTOR.

1.03 SPECIFICATION SENTENCE STRUCTURE

- A. Specifications are written in modified brief style. Requirements apply to all Work of the same kind, class, and type even though the word "all" is not stated.
- B. Simple imperative sentence structure is used which places a verb as the first word in the sentence. It is understood that the words "furnish", "install", "provide", or similar words include the meaning of the phrase "The CONTRACTOR shall..." before these words.
- C. It is understood that the words "directed", "designated", "requested", "authorized", "approved", "selected", or similar words include the phrase "by the ENGINEER" after these words unless otherwise stated.
- D. "At no additional cost to OWNER", "With no extra compensation to CONTRACTOR", "At CONTRACTOR's own expense", or similar words mean that the CONTRACTOR will perform or provide specified operation of Work without any increase in the Contract Price. It is understood that the cost for performing all Work is included in the amount bid and will be performed at no additional cost to the OWNER unless specifically stated otherwise.

1.04 INTERPRETATIONS OF QUANTITY, QUALITY, AND PROVISION OF MATERIALS AND EQUIPMENT

- A. Quantity or quality level shown or indicated shall be minimum to be provided or performed in every instance.
- B. Actual installation may comply exactly with minimum quality indicated, or it may exceed that minimum within reasonable limits.

- C. In complying with these requirements, indicated numeric values are minimum or maximum values, as noted, or appropriate for context of requirements.
- D. Refer instances of uncertainty to the ENGINEER for a decision before proceeding.
- E. Provide materials and equipment comparable in quality to similar materials and equipment incorporated in the Project or as required to meet the minimum requirements of the application if the materials and equipment are shown in the drawings but are not included in the Specifications.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Administrative and General Requirements
2. CONTRACTOR's Field Office
3. ENGINEER's Field Office
4. Temporary Sanitary Facilities
5. Temporary Water
6. Temporary Low Flow Dewatering
7. Temporary Pollution Control
8. Temporary Electricity
9. Temporary Telephone and Internet
10. Temporary Fire Protection
11. Temporary Lighting
12. Temporary Gates and Fences
13. Temporary Cranes, Derricks and Hoists
14. Temporary Boats and Barges
15. Temporary construction entrance(s), staging area, parking area, fencing, gates, and similar facilities.

B. Related Sections:

1. Section 01 33 00 – Submittal Procedures
2. Section 01 78 00 – Closeout Submittals

1.02 REFERENCES

A. Reference Standards:

1. National Electric Code (NEC):
 - a. Article 590 – Temporary Installations.
2. National Fire Protection Association (NFPA)
 - a. Article 10 – Standard for Portable Fire Extinguishers
 - b. Article 241 – Safeguarding Building Construction, Alteration, and Demolition Operations
3. Occupational Safety and Health Administration (OSHA):
 - a. 1926.605 – Marine Operations and Equipment.
 - b. 29 CFR Part 1926 – Cranes and Derricks in Construction.

1.03 SUBMITTALS

A. Action Submittals:

1. Submit the following to the ENGINEER for approval in accordance with the requirements of Section 01 33 00 – Submittal Procedures.

- a. Floor plans of field office(s).
- b. Construction Staging Layout.
- c. Temporary utility connection details.
- d. Pollution Prevention Plan.
- e. Low Flow Dewatering Plan.
- f. Crane Lift Plans (if required).
- g. Vessel specifications and Work Plan (if required).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. In performing the Work, it may be necessary for the CONTRACTOR in cooperation with the OWNER to plan, design, and provide various temporary services, utilities, connections, piping, heating, cooling, access, or other facilities or services at no increase in the Contract Price.
2. Notification of Utilities:
 - a. At least 2-days in advance of work that may affect property and utility owners, properly notify them of this work.
 - b. At least 3-days prior to the start of any subsurface work, contact Texas Call Before You Dig at 811 or 1-800-545-6005, or log onto Texas Call Before You Dig (<https://www.texas811.org>).
 - 1) Before exposing any utilities, obtain the utility owner's permission
 - a. Should the utility service be interrupted, notify the proper authorities immediately.

1.05 GENERAL REQUIREMENTS

- A. The CONTRACTOR is solely responsible for temporary facilities and controls removal and restoration of the affected area when the temporary facilities and controls are no longer needed or required by Contract Time and extensions thereof.
- B. The CONTRACTOR shall provide all labor, materials, equipment, and incidentals necessary to construct temporary facilities to provide and maintain control over environmental conditions at the job site, including the removal of temporary facilities when no longer needed.
- C. CONTRACTOR shall provide all temporary utilities required for the Project except as otherwise allowed under these Contract Documents.
- D. Make all arrangements with utility service companies for temporary services and obtain required permits and approvals for temporary utilities.
 1. Pay all utility service costs, including cost of electricity, water, fuel, and other utility services required for the Work.
 2. Continuously maintain adequate utilities for all purposes during the Project, until removal of temporary utilities and temporary facilities. At minimum, provide and maintain temporary utilities through Substantial Completion.

3. Maintain, including cleaning, temporary utilities and continuously provide consumables as required.
4. Temporary utilities and temporary facilities shall be adequate for personnel using the Site and requirements of Project.
5. Provide temporary utilities and temporary facilities in compliance with Laws and Regulations and, when applicable, requirements of utility owners.
6. Existing Utility Systems:
 - a. Do not use systems in existing buildings or structures for temporary utilities without OWNER's written permission and mutually acceptable basis agreed upon by the parties for proportionate sharing of costs between OWNER and CONTRACTOR.
 - b. Do not use the following permanent facilities:
 - 1) Telephone and communication facilities.
 - 2) Sanitary facilities.

1.06 CONTRACTOR'S FIELD OFFICE

- A. The CONTRACTOR shall provide and maintain, in good condition, a CONTRACTOR's field office located within the staging/laydown/office area.
- B. The field office shall be of suitable size for construction administrative operations and meetings with the ENGINEER and OWNER.
- C. The CONTRACTOR shall make arrangements, obtain all permits (if necessary) and pay all costs, including utility services.
- D. The field office shall be furnished and ready for occupancy within thirty (30) calendar days of Notice-to-Proceed or within one (1) calendar day of mobilization, whichever comes first.
- E. The field office shall be maintained and serviced by the CONTRACTOR until the final invoice has been submitted by the CONTRACTOR and approved by the OWNER.
- F. The CONTRACTOR shall remove or legally dispose of the field office offsite at the CONTRACTOR's expense.
- G. The field office shall at minimum consist of the following:
 1. Weather tight and structurally sound office trailers;
 2. Sufficiently secured from high winds to prevent any movement;
 3. Good commercial quality materials;
 4. Flooring that is capable of withstanding a live load of 125 pounds per square foot;
 5. Neatly painted walls;
 6. Screened windows;
 7. All exterior doors keyed and lockable;
 8. Exterior lighting located over the trailer entrance doors;
 9. Uniform lighting throughout the office interiors;
 10. Heating and air-conditioning throughout the office/trailer interiors;

11. Ethernet and WiFi wireless office network to allow all computer systems in the field office to access the field office internet service;
12. Internet connectivity speeds of 10Mbps upload and 50Mbps download;
13. Standard 120 V receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of office equipment.
14. Office furnishings to support weekly construction meetings for up to twelve (12) people.
15. First aid kit and fire extinguishers.
16. Bottled drinking water.

H. Submit the CONTRACTOR Field Office layout, location, furnishings, equipment and utility connection for review by the ENGINEER.

1.07 ENGINEER's FIELD OFFICE

- A. The CONTRACTOR shall provide a field office for use by the ENGINEER or OWNER.
- B. The ENGINEER's field office shall be located within the CONTRACTOR's staging/laydown/office area.
- C. The ENGINEER's field office may be located within the CONTRACTOR's field office or a separate mobile unit/temporary building.
- D. The ENGINEER's field office shall be furnished and ready for occupancy within thirty (30) calendar days of Notice-to-Proceed or within one (1) calendar day of mobilization, whichever comes first.
- E. The ENGINEER's field office shall be maintained and serviced by the CONTRACTOR until the final invoice has been submitted by the CONTRACTOR and approved by the OWNER.
- F. The CONTRACTOR shall remove or legally dispose of the field office offsite at the CONTRACTOR's expense.
- G. The ENGINEER's field office shall at minimum consist of the following for use by the ENGINEER and OWNER:
 1. 10' x 10' office space (or larger);
 2. Weather tight and structurally sound office trailers;
 3. Sufficiently secured from high winds to prevent any movement;
 4. Good commercial quality materials;
 5. Flooring that is capable of withstanding a live load of 125 pounds per square foot;
 6. Neatly painted walls;
 7. Screened windows;
 8. All exterior doors keyed and lockable;
 9. Exterior lighting located over the trailer entrance doors;
 10. Uniform lighting throughout the office interiors;
 11. Heating and air-conditioning throughout the office/trailer interiors;

12. Ethernet and WiFi wireless office network to allow all computer systems in the field office to access the field office internet service;
13. Internet connectivity speeds of 10Mbps upload and 50Mbps download;
14. New printer/scanner combo unit including all cables, connections and software required to connect to the network;
15. Standard 120 V receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of office equipment.
16. The following office furnishings:
 - a. One 3-foot by 6-foot plan table or desk;
 - b. Two (2) office chairs;
 - c. A lockable metal two (2) drawer filing cabinet. Furnish the ENGINEER with two sets of keys. The CONTRACTOR shall not retain any key to this cabinet;

H. Submit the ENGINEER Field Office layout, location, furnishings, equipment and utility connections for review by the ENGINEER.

I. Maintenance

1. Maintain the field offices in a proper, safe, sanitary and operating condition for the duration of the Contract or of their use.
2. Continuously maintain the field offices and provide janitorial services on a weekly basis for the duration of the Contract time.

1.08 TEMPORARY SANITARY FACILITIES

- A. Provide self-contained, single occupant, combination toilet and urinal units of chemical, aerated recirculation, or combustion type.
- B. Provide vented, fully enclosed units having a shell fabricated from glass fiber reinforced polyester or a similar nonabsorbent material.
- C. Provide self-contained hand wash sinks with provision for potable water storage. Provide one self-contained unit for every four (4) toilets, but not less than two (2) units.
- D. One of the self-contained, single occupant toilet units shall be for dedicated use by the ENGINEER and have a padlock hasp.
- E. The sanitary facilities shall be ready for use within thirty (30) calendar days of Notice-to-Proceed or within one (1) calendar day of mobilization, whichever comes first.
- F. The sanitary facilities shall be sufficiently secured from high winds to prevent movement.
- G. The sanitary facilities shall be maintained and serviced by the CONTRACTOR until the final invoice has been submitted by the CONTRACTOR and approved by the OWNER.

H. Maintenance:

1. Maintain the temporary facilities in a proper, safe, sanitary and operating condition for the duration of the Contract or of their use.
2. Keep toilet facilities equipped, clean, and sanitary at all times.

1.09 TEMPORARY WATER

- A. Provide temporary water facilities including piping, valves, meters if not provided by owner of existing waterline, backflow preventers, pressure regulators, and other appurtenances. Provide freeze-protection as required.
- B. Provide water for temporary sanitary facilities, field offices, site maintenance and cleaning and, when applicable, disinfecting and testing of systems.
- C. Continuously maintain adequate water flow and pressure for all purposes during the PROJECT, until removal of temporary water system.
- D. Potable water is available in the CONTRACTOR's staging work area from a one-inch (1") waterline. Pressures and flow rates are not guaranteed.
- E. OWNER has a permanent two-inch (2") waterline along the dam's bridge deck. The waterline delivers water from Lake Granbury and is non-potable.
 1. OWNER will make the waterline available as-is to CONTRACTOR without cost and without any warranty of its condition.
 2. The pump feeding the waterline is inoperable. The CONTRACTOR may replace/repair the pump and/or waterline at the CONTRACTOR's expense.
 3. If the CONTRACTOR chooses to make any repairs to the pump and/or the two-inch (2") non-potable waterline system, the CONTRACTOR shall coordinate with the OWNER for all work and submit a temporary water connection detail for review by the ENGINEER.

1.10 TEMPORARY LOW FLOW DEWATERING:

- A. See Construction Plan Sheet S001 for Low Flow Dewatering and Bulkhead Notes.

1.11 TEMPORARY POLLUTION CONTROL

- A. The CONTRACTOR is responsible for preparing, maintaining, executing and updating a pollution prevention plan for this contract that covers all construction and construction-related activities of the project at the Site at no additional cost to the Project.
- B. At all times, observe and comply with all Laws and Regulations which in any manner relate to pollution control. Prevent the contamination of soil, water, or atmosphere by the discharge of noxious substances and/or contaminants from construction operations. Provide adequate measures to prevent the creation of noxious airborne pollutants. Prevent dispersal of pollutants into the atmosphere. The CONTRACTOR shall not dump or otherwise discharge noxious or harmful fluids, substances, and/or

contaminants into drains or sewers, nor allow noxious liquids, substances, and/or contaminants to contaminate public waterways in any manner.

- C. Provide equipment and personnel and perform emergency measures necessary to contain any spillage.
- D. Contain chemicals in protective areas and do not dump on soil, in the lake or in any waterway. Dispose of such materials at off-site locations in an acceptable manner.
 - 1. If contamination of the soil does occur, promptly notify the ENGINEER and OWNER and appropriate regulatory agencies, excavate contaminated soil and dispose at an off-site location properly licensed or permitted to handle such soil.
 - 2. Provide documentation to the ENGINEER and appropriate regulatory agencies which states the nature and strength of the contaminant, method of disposal, and the location of the disposal site.
 - 3. Fill resulting excavations with suitable backfill and compact to the density of the surrounding undisturbed soil.
 - 4. Activities performed pursuant to this section shall be conducted in accordance with any and all Laws and Regulations.
- E. The contractor may utilize the low flow weir basin as a collection and sediment basin and is responsible for isolating the basin such that no unauthorized discharges are made.
- F. See also Construction Drawing Sheet S001, General Notes.
- G. The CONTRACTOR shall prepare and submit Pollution Prevention Plan which includes at minimum the following or as specified by regulatory authority:
 - 1. CONTRACTOR name and contact information.
 - 2. Site map and project description.
 - 3. Potential sources of pollutants from construction activities.
 - 4. Their corresponding BMP's that will be implemented.
 - 5. Plan for monitoring the site and maintaining BMP's.
 - 6. Plan for lawful disposal of sediment and pollutants.
 - 7. Permits and/or jurisdictional authorizations (if required).

1.12 TEMPORARY ELECTRICITY

- A. The CONTRACTOR is responsible for providing temporary electrical service required for the Work. Provide temporary outlets with circuit breaker protection and ground fault protection.
- B. OWNER does have a permanent 480 volt/225 amp electric power along the dam's bridge deck. OWNER will make available up to 100 amps of 480 voltage electrical power on the bridge deck to the project site with use and availability restrictions.
 - 1. The OWNER does not guarantee usage and availability of electric power.
 - 2. Electric power use for dam operations such as the radial gates will take precedent over CONTRACTOR use.

3. CONTRACTOR will coordinate usage with OWNER and submit a temporary electric connection detail for review by the ENGINEER.
- C. An electric power pole is available near the CONTRACTOR staging area at the north end of the dam. CONTRACTOR shall be responsible for providing connection to and obtaining approval to utilize this power source.
- D. CONTRACTOR shall be responsible for metering and paying for its power usage at the staging area. Note: This power source is differentiated from the power source on the dam bridge deck and will not be made available to the CONTRACTOR without cost.
- E. All temporary electric facilities installed shall meet National Electric Code (NEC) Article 590 requirements.

1.13 TEMPORARY TELEPHONE

- A. Provide at least one (1) mobile phone on Site at all times.

1.14 TEMPORARY FIRE PROTECTION

- A. Provide temporary fire protection, including portable fire extinguishers rated not less than 2A or 5B in accordance with NFPA 10, Standard for Portable Fire Extinguishers, for each temporary building and for every 3,000 square feet of floor area under construction.
- B. Comply with NFPA 241, Safeguarding Building Construction, Alteration, and Demolition Operations, and requirements of fire marshals and authorities having jurisdiction at the Site.

1.15 TEMPORARY LIGHTING

- A. Minimum lighting shall be five foot-candles for open areas and ten foot-candles for stairs and shops. Provide minimum of one, 300-watt incandescent lamp (or other lamp types providing equivalent luminosity) every 15 feet in indoor Work areas. Provide night security lighting of five foot-candles, minimum, within 50 feet of all parts of the Site during hours of darkness, controlled by photocell.

1.16 TEMPORARY GATES AND FENCES

- A. The CONTRACTOR is responsible for ensuring that the public is protected from the construction operations. Signs, fences and other measures shall be used as necessary depending on site conditions. Temporary gates and fences shall be installed wherever it is necessary to operate construction equipment through existing fences. Gates shall be kept closed except when construction equipment and the CONTRACTOR's employees are passing through.

1.17 TEMPORARY CRANES, DERRICKS AND HOISTS

- A. The use of a temporary cranes, derricks and/or hoists by the CONTRACTOR is a means and methods construction activity at no additional cost to the Project.
- B. Temporary loading on a structure shall not exceed any specified load limits. If no load limits are specified or available, the CONTRACTOR may be required to perform a structural capacity and loading analysis.
- C. If the CONTRACTOR wishes to utilize a crane, derrick and/or hoist, the CONTRACTOR shall submit for review a Lift Plan. Minimum requirements include:
 - 1. Comply with OSHA standards for use of Cranes and Derricks in Construction, 29 CFR Part 1926 – Cranes and Derricks in Construction.
 - 2. Lift Plans must be submitted at least 10 business days prior to crane mobilization.
 - 3. Lift Plans must be based on worst case % of capacity (i.e. gross deductions / chart capacity) for each specific crane, derrick and/or hoist configuration and location and activity.
 - 4. All rigging devices must bear the name of the manufacturer and identify working load limit and be certified as to their capacity. Custom-fabricated devices (lifting beams, spreader bars, etc) may be acceptable if sealed by a qualified Professional Engineer (licensed in the State of Texas) or proof testing as required by applicable standards. Capacities shall be marked and legible on all such devices.
 - 5. Competent and qualified operator and supervisor.
 - 6. Worker credentials – license, medical certification, OSHA 10 cards.
 - 7. Load chart.
 - 8. Range chart.
 - 9. Dimension illustration and specifications for crane, derrick and/or hoist.
 - 10. Lightning and wind restrictions (from operators manual).
 - 11. Crane, derrick and/or hoist dimensions and area (quadrant) of operation diagram.
 - 12. Copy of annual 3rd party inspection certification and report.
 - 13. Scaled site plan and elevation drawings.
 - 14. Supporting structure loading plan and capacity.

1.18 TEMPORARY BOATS AND BARGES

- A. The use of a temporary boat and/or barge by the CONTRACTOR is a means and methods construction activity at no additional cost to the Project.
- B. If the CONTRACTOR wishes to utilize a boat and/or barge, the CONTRACTOR shall submit for review vessel specifications, work plan, requested put-in and take-out schedule, requested staging plan(s) and temporary anchoring plans.
- C. Use of boats and/or barges are subject to review, OWNER requirements including operational restrictions of the dam, and emergency conditions.
- D. The CONTRACTOR is responsible for complying with OSHA requirements including but not limited to OSHA 1926.605 – Marine Operations and Equipment.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Temporary Water Extensions: Provide temporary piping, water hoses and controls maintained in leak free condition.
- B. Temporary Power Equipment and Extensions:
 - 1. Provide OSHA approved portable power equipment and extension cords, temporary wires, outlets and on/off controls.
 - 2. All temporary electric facilities installed shall meet National Electric Code (NEC) Article 590 requirements.
- C. Temporary Lights: Provide portable task lights equipped with crash guards in conformance with OSHA requirements.

PART 3 EXECUTION

3.01 ACCESS, PARKING AND STORAGE AREAS

- A. Construct stabilized construction entrances/access areas.
- B. Construct stabilized parking areas, and storage areas as needed to accommodate traffic and not damage the site.
- C. Restore to at least the original condition entrances, access areas, parking areas, and storage areas.

3.02 UTILITIES

- A. Maintain in continuous service existing utilities including, but not limited to, gas pipelines, underground power, telephone or communication cable, water mains, irrigation lines, sewers, poles and overhead power, and other utilities encountered, unless other arrangements have been made with the respective utility owners.
 - 1. Take responsibility for protecting, shoring, bracing, supporting and maintaining underground pipes, conduits, drains or other utilities.
 - 2. Maintain fire hydrants and water control valves in operating condition, free from obstruction, accessible, and available for use, including signage and markings.
 - 3. Do not impair operation of existing sewer systems.
 - a. Prevent construction material, pavement, concrete, earth, volatile and corrosive waste, and other debris from entering sewers, pump stations, or other waste structures.
 - b. Maintain original Site drainage wherever possible.

3.03 REMOVAL

- A. Dismantle (as required) and remove temporary facilities and controls, and temporary service extensions when no longer need on construction site.

3.04 REPAIR / RESTORATION

- A. Upon completion of the Contract, the field offices becomes the property of the CONTRACTOR, and the CONTRACTOR must remove, dismantle, or otherwise dispose of the field offices.
- B. Repair damage caused by the installation or use of temporary work. Restore permanent facilities, turf/grass areas, and ground surface areas used during the Contract period to their original or otherwise specified condition.

3.05 RE-INSTALLATION

- A. Re-install permanent facilities that were temporarily removed during the Contact period.

3.06 CLOUSEOUT ACTIVITIES

- A. Upon completion of the Contract, remove the temporary facilities and controls from the Site, except those designated to remain.
 - 1. Remove temporary utilities, equipment, facilities, and materials prior to submitting the Final Application for Payment.
 - 2. Remove any temporary underground installations to a minimum depth of 2 feet and restore/backfill any shallow underground installation excavations.
 - 3. The field office and ENGINEER's field office shall be maintained and serviced by the CONTRACTOR until the final invoice has been submitted by the CONTRACTOR and approved by the OWNER. See also Articles 1.06.E and 1.07.F.

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 01 56 80
SECURITY MEASURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. General requirements for background checks and providing security at the Project Site during construction.
- B. Related Sections:
 - 1. Section 01 33 00 – Submittal Procedures

1.02 REFERENCES

- A. Reference Standards
 - 1. International Organization for Standardization (ISO):
 - a. ISO/IEC 7810:2019 – Identification Cards – Physical Characteristics

1.03 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Conditions and all Supplementary Conditions.
 - 1. Qualifications:
 - a. Full name (including middle name) and date of birth for each CONTRACTOR and subcontractor employee who will be accessing the PROJECT site.
 - 2. Contract Closeout Submittals:
 - a. All CONTRACTOR issued security badges.

1.04 BACKGROUND SECURITY CLEARANCES

- A. The CONTRACTOR shall perform background checks on each CONTRACTOR and subcontractor employee who will be accessing the site.
 - 1. Background security check shall be no older than one year prior to Notice to Proceed.
 - 2. Acceptable background sources of information include the United States Federal Government, the Department of Public Safety from the employee's home state (the state that issued their driver's license or identification card), and for non-citizens, the native country's national law-enforcement agency.
 - 3. Disqualifiers for Security Checks include:
 - a. Murder Conviction.
 - b. Any Terroristic Act or Threat.
 - c. Any Registered Sex Offender.
 - d. Any Conviction of Violence that Causes Serious Bodily Injury within past 5 years.

- e. Theft Conviction within past 10 years.
 - f. Burglary Conviction within past 10 years.
 - g. CONTRACTOR and OWNER may add additional disqualifiers.
- 4. The results of each background check shall be dated and the original, certified official document from the agency performing the check kept by the employer, and shall bear all appropriate seals and signatures of the agency performing the check, including the agency address and telephone number. The OWNER reserves the right to visit the employer's office, whether awarded CONTRACTOR or sub-contractor, and employer will provide on demand the certified original documents to the OWNER for review. The documents shall not be removed from the employer's office. Any employee, for whom no certified official document from the agency performing the check is furnished, shall be immediately and permanently removed from the job site.
- 5. The results of background checks may be audited by the OWNER as described above at any time without advanced notice.
- B. The CONTRACTOR shall submit to the OWNER the full name (including middle name) of each CONTRACTOR and subcontractor employee who will be accessing the PROJECT site at least 72 hours before planned arrival to the PROJECT site.
- C. The CONTRACTOR shall provide security badges to all authorized CONTRACTOR and subcontractor employees and meet the following minimum requirements:
 - 1. Individuals who have incomplete background checks and/or their background check has been denied shall not receive a security badge and shall not access the site.
 - 2. Issue an individual security badge to each authorized employee upon arrival to the site.
 - 3. Security badge shall not be issued unless proper photo identification is presented at the time of issuance.
 - 4. Individuals shall carry their security badges with them at all times while on the project site.
 - 5. Security badge cards:
 - a. Type ID-1 cards per ISO 7810 (CR80):
 - 1) Vertical orientation
 - 2) 30 Mil PVC
 - 3) Dimensions: 2.125" x 3.375"
 - b. Printed information:
 - 1) Project Name: De Cordova Low Flow Outlet Works Project
 - 2) Current color photo ID (W=1.1" x H=1.3")
 - 3) First and last name
 - 4) CONTRACTOR or Subcontractor company name (direct employer)
 - 5) Color coding background strip at the bottom (CONTRACTOR = blue, subcontractor = red)
 - c. See attached security badge layout
 - 6. The CONTRACTOR is responsible for replacing any lost or damaged security badges.
 - 7. Lost or stolen security badges shall be reported to the OWNER immediately.

8. The CONTRACTOR is responsible for collecting all issued security badges and turning them over (submitting) to the ENGINEER or OWNER at the completion of the project.
- D. The OWNER may perform background checks separate from the CONTRACTOR-performed background checks.
- E. Any CONTRACTOR or subcontractor employee that does not meet the security qualifications from Article 1.03.A.3 or is deemed a security threat by the OWNER shall not access the PROJECT site or shall have their access privileges revoked.

1.05 PROTECTION OF WORK AND PROPERTY

- A. Security of CONTRACTOR equipment, supplies and the work areas are the responsibility of the CONTRACTOR.
- B. CONTRACTOR shall comply with any and all security requirements established by the OWNER.
- C. Provide security against vandalism and theft of all materials and products.
- D. Take positive measures to prevent entry to Site of work and storage areas by children, animal and unauthorized adults.
 1. Provide temporary fencing if determined by the CONTRACTOR to be necessary to adequately fence off storage and operating areas.
 2. Provide night security, if problems arise at construction Site relating to public safety, etc. Vandalism connected with construction of Project is sufficient grounds for requiring security.
 3. Payment for night security, if determined necessary by the OWNER, will be via Change Order.

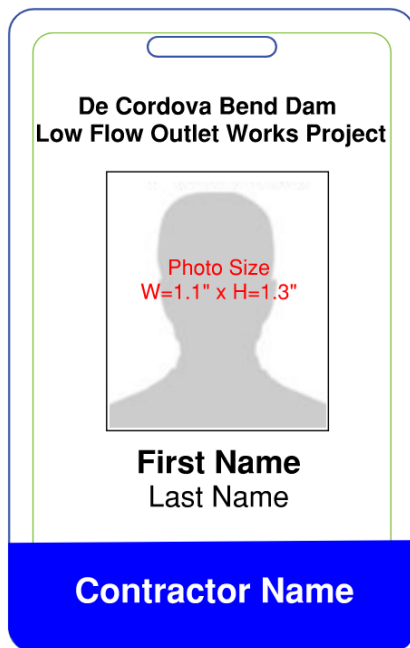
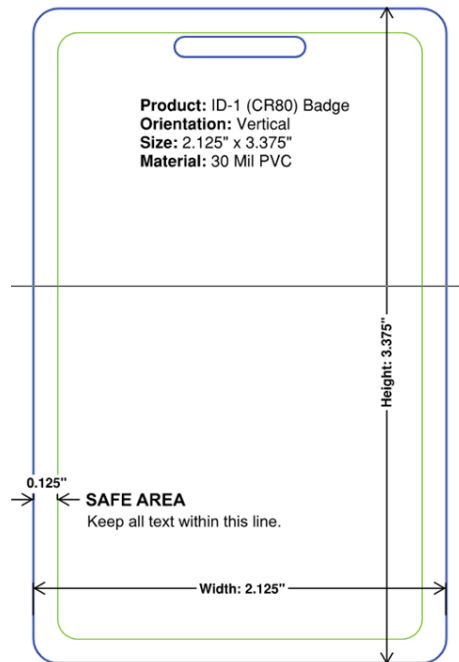
PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECURITY BADGE LAYOUT



SECTION 01 64 00
OWNER FURNISHED PRODUCTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Materials and equipment furnished by the OWNER for installation by the CONTRACTOR.
- B. Related Sections:
 - 1. Section 01 11 00 – Summary of Work
 - 2. Section 01 31 00 – Project Management and Coordination
 - 3. Section 01 32 00 – Construction Progress Documentation
 - 4. Section 35 22 26 – Slide Gates

PART 2 PRODUCTS

2.01 OWNER-FURNISHED/CONTRACTOR-INSTALLED PRODUCTS (OFCI)

- A. 84"x96" STAINLESS-STEEL SLIDE GATE FABRICATION:
 - 1. The following items are OWNER supplied and will be manufactured and/or delivered to the site by Hydro Gate, Inc. (Gate Manufacturer):
 - a. Two (2) new 84"x96" slide gates and frames, including UHMW seats/seals and fasteners.
 - b. Two (2) new 84"x96" Type "E" full-face insulating gasket sets.
- B. See also Specification Section 01 11 00 – Summary of Work.

PART 3 EXECUTION

3.01 GENERAL EXECUTION REQUIREMENTS

- A. Materials and equipment listed herein will be purchased and delivered by OWNER. The OWNER will deliver the materials and equipment to the project site.
- B. The CONTRACTOR will be responsible for unloading, handling, and storage of the OWNER provided materials and equipment. The CONTRACTOR will offload the OWNER provided materials and equipment and will store them onsite. The CONTRACTOR will take full ownership of the OWNER provided materials and equipment once loading operations, using CONTRACTOR provided means and methods commence.
- C. The CONTRACTOR shall coordinate delivery and provide a proposed delivery schedule and plan for all materials provided by the OWNER at least 30 days prior to the CONTRACTOR's proposed delivery date. Delivery schedule shall be

incorporated into the project schedule. See also Specification Section 01 31 00 – Project Management and Coordination, and Specification Section 01 32 00 – Construction Progress Documentation.

- D. CONTRACTOR shall verify mounting requirements for accepted products.
- E. Prior to commencing Work, CONTRACTOR shall verify that Work specified in other Sections has been properly completed and installed as specified to allow for installation of all materials and methods required of this Section.
- F. CONTRACTOR shall verify that new and existing products and conditions are satisfactory for installation of OFCI products. If unsatisfactory conditions exist, do not commence the installation until such conditions have been corrected.
- G. CONTRACTOR shall reinstall any existing products and/or equipment removed by the CONTRACTOR to accommodate the Work in accordance with Contract Documents, reviewed shop drawings, and/or original manufacturer's instructions and recommendations if applicable.
- H. CONTRACTOR shall install OWNER-furnished products in accordance with reviewed shop drawings and manufacturer's printed instructions, as applicable.
- I. CONTRACTOR shall adjust products as necessary to satisfy the Contract Documents.
- J. See also Specification Section 35 22 26 – Slide Gates.

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 01 65 00
PRODUCT DELIVERY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. General procedures and requirements for product delivery.
- B. Related Sections:
 - 1. Supplementary Conditions Section SC-101 – Transportation, Storage and Protection.
 - 2. Section 01 66 00 – Product Storage and Handling Requirements.

1.02 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Conditions and all Supplementary Conditions.
- B. Coordination Submittals:
 - 1. Delivery Schedule and Item List.
 - 2. Shipping notices with copy of Bill of Lading for any Product Delivered to Site.

1.03 GENERAL REQUIREMENTS

- A. Coordinate with Item SC-101 (Transportation, Storage and Protection) in section 00800 – Supplementary Conditions for related requirements.

1.04 TRANSPORTATION AND DELIVERY

- A. The CONTRACTOR shall be responsible for timely delivery to the project site of all items (including spare parts) procured by the CONTRACTOR. The CONTRACTOR shall keep a system in place to continuously track shipments of all delivery items from the time it leaves the place of origin until it arrives at the Site.
- B. The CONTRACTOR shall transport and handle items in accordance with Manufacturer's instructions. All items shall be delivered to the Site in undamaged condition, in Manufacturer's original sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting, and installing. All items delivered to the Site shall be unloaded and placed in a manner which will not hamper the CONTRACTOR's normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic. The CONTRACTOR shall provide necessary equipment and personnel to unload all items delivered to the Site. The CONTRACTOR shall promptly inspect shipment to assure that products comply with requirements, quantities are correct, and items are undamaged. For items furnished by others (i.e. OWNER, other contractors),

perform inspection in the presence of the ENGINEER. Notify ENGINEER verbally, and in writing, of any problems.

- C. The CONTRACTOR shall assume and be liable for the entire risk involving damage or loss while equipment is in transit, and shall be responsible for filing all claims with its insurance carrier for damaged and lost equipment and shall promptly replace or repair any damaged or lost equipment, without awaiting the finalization of insurance claims. At all times, the CONTRACTOR shall be responsible for all risk of loss in accordance with the Contract Documents.
- D. The CONTRACTOR shall submit a delivery schedule with his bid for various items of equipment to be procured by the CONTRACTOR, including structural items for the construction of the new spillway bridge, anchorages for trunnion support girders, and accessories. The delivery schedule shall correspond to the project construction schedule.
- E. The CONTRACTOR agrees and understands that all duties, tariffs, fees, insurance, expenses, and other costs associated with transporting, shipping, delivery, and importing the equipment, apparatus, and materials to be furnished and expended by the CONTRACTOR or its subcontractors or its agents are to the account of the CONTRACTOR and are included in the Contract price. The CONTRACTOR shall be responsible for any and all expenses associated with transporting and importing of the equipment from the place of origin to the Site including the payment of all customs duties (including, but not limited to, regular, antidumping, and countervailing duties) and any customs, liquidated damages, fines and or penalties that may be imposed. Proof of all payments towards duties, tariffs, fees, insurance, expenses, and other costs associated with the export from any country, transportation, and import of the equipment to the Site shall be provided to the Owner within 45 days of payments made by CONTRACTOR.
- F. The CONTRACTOR shall ensure that all shipments have readable packing slips attached to the bill of lading and all item numbers on the packing slip correspond to the item numbers on the parts master list. A copy of each packing list shall be affixed by the equipment supplier to the respective component or box.
- G. The CONTRACTOR shall ensure that the packaging undertaken by the supplier is adequate to prevent contamination, mechanical damage, or deterioration of the item supplied, so that the parts do not have to be reordered and the project construction is not delayed.
- H. The CONTRACTOR shall ensure that all equipment is adequately braced and supported for shipment. Any bracing required only for shipping purposes shall be marked by the supplier to indicate the proper sequence of its removal prior to operation.
- I. The CONTRACTOR shall submit a copy of shipping notices with copies of bill of lading to the OWNER. The CONTRACTOR shall ensure that all components and

accessories of the work are tagged, stenciled, or stamped with the item number of the piece of equipment with which it belongs and with an identifying number or designation that can be referenced back to the appropriate assembly drawing.

- J. The CONTRACTOR shall receive, unload, inspect, store, clean, install, touch-up paint, adjust, service, and perform a complete checkout of any materials or equipment delivered to the site, including the gate equipment items and spare parts. Receiving, unloading, and inspection shall be performed by the CONTRACTOR in presence of the ENGINEER.
- K. The CONTRACTOR shall store and protect products in accordance with the Manufacturer's instructions, with seals and labels intact and legible. Storage instruction shall be studied by the CONTRACTOR and reviewed with the ENGINEER. Instruction shall be carefully followed and a written record of this kept by the CONTRACTOR. The CONTRACTOR shall arrange storage to permit access for inspection.
- L. The CONTRACTOR shall promptly inform the ENGINEER of any shortcoming in the equipment delivered, including short supply or damage during transit and make arrangement with the ENGINEER for replacements or repairs, as appropriate.
- M. No product requiring submittals in the Contract Documents shall be delivered to the site until the submittal process has been satisfactorily concluded. Any product found on site without such submittal conclusion shall be removed from the site at no additional cost to the OWNER.

1.05 PROTECTION AND STORAGE

- A. See Specification Section 01 66 00 – Product Storage and Handling Requirements.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 01 66 00

PRODUCT STORAGE AND HANDLING REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. General requirements for storage, handling and protection of materials and products used in the work.
- B. Related Sections:
 - 1. Supplementary Conditions Section SC-101 – Transportation, Storage and Protection

1.02 GENERAL REQUIREMENTS

- A. Coordinate with Item SC-101 (Transportation, Storage and Protection) in section 00800 – Supplementary Conditions for related requirements.
- B. Store equipment and materials in an orderly manner in designated work site storage area. Only bring equipment and materials to work areas when needed. Assume responsibility for security of storage area and work site and protect installed items until acceptance by ENGINEER of final performance tests.
- C. The CONTRACTOR shall assume full responsibility for the protection and safekeeping of products stored at the site. Protect and secure the products until installed.

1.03 STORAGE OF MATERIALS AND EQUIPMENT

- A. Store products to prevent wind damage and secure products and storage containers for protection against wind.
- B. Store valves and gaskets, grass seed and any other items which manufacturer or supplier recommends be stored above 50 degrees F., on wooden or concrete floor in wooden or metal enclosed structure(s).
- C. Keep structure clean, dry and heated. Protect structure and subsequent work areas from dirt, dust, water, rain, snow, condensation, freezing conditions and any other conditions detrimental to life of equipment and material from date of delivery till control of equipment is assumed by OWNER. Maintain 50 degrees F. minimum temperature within enclosure.
- D. Pipe, fittings, and steel may be openly stored, on wooden platforms. Schedule delivery of primed steel so as not be exposed directly to sunlight for over two months and will

be installed and finished painted within five months after priming. If above requirement is not met, blast clean primer and reprime steel.

1. Pipes and conduits stored outdoors are to have open ends sealed to prevent the entrance of dirt, moisture, and other injurious materials.
2. Protect PVC pipe from ultraviolet light exposure.

- E. Properly store each item in accordance with manufacturer's recommendations and supplemental requirements included in particular specification section covering material or equipment. Store materials and equipment in a neat and orderly manner to facilitate locating, inspecting, maintaining and removing when needed. Avoid damage to any item during handling and storage. Handling of equipment is as specified under the particular material or equipment specification section and as recommended by the manufacturer. Repair damaged items to satisfaction of ENGINEER or replace if directed by ENGINEER at no additional cost to OWNER.
- F. Check material and equipment when delivered to ensure it conforms to Contract Documents and Shop Drawings, and has not been damaged during shipment. Any materials or equipment not in compliance with the Contract Documents and Shop Drawings will be directly returned to the manufacturer. Report damaged items to attention of ENGINEER, who will decide whether item can be repaired in field or must be returned to manufacturer or supplier at no expense to OWNER.

1.04 MAINTENANCE OF MATERIALS AND EQUIPMENT

- A. Obtain from manufacturer, prior to or at delivery, written instructions and recommendations for storing, handling and maintaining material or equipment until it is field tested. Develop a comprehensive maintenance program and schedule from received information and submit to ENGINEER for approval for stored and installed material and equipment. Approval is for general procedures and content and in no way relieves responsibility for proper storage, protection, handling and maintenance of the equipment. If any materials and/or equipment are found not to be in an as new condition when it is to be installed or during testing, ENGINEER, at his discretion, may order the CONTRACTOR to furnish and install new material or equipment, or repair material or equipment to his satisfaction, at no additional cost to OWNER.
- B. To reduce possibility of damage to materials and equipment which will not be used until the late stages of construction, schedule fabrication and deliveries if possible so that materials and equipment are only on storage site for a minimum amount of time before they are installed.
- C. Maintain storage facilities. Inspect stored products on a weekly basis and after periods of severe weather to verify that:
1. Storage facilities continue to meet specified requirements.
 2. Manufacturer's required environmental conditions are continually maintained.
 3. Surfaces of products exposed to the elements are not adversely affected.

1.05 ADDITIONAL STORAGE SPACE

- A. If determined that additional storage space is needed, or preference to use nearby off-site storage for some materials and equipment because of better controlled storage conditions and/or security, submit a written request to ENGINEER stating reasons for wanting the off-site storage, its location, size, structure type, type of heat if applicable, etc; and when it can be inspected by the ENGINEER. If ENGINEER approves the off-site storage site, all of the above conditions and responsibilities pertaining to on site storage will apply. Assume all costs related to acquisition of off-site storage facilities at no extra or additional cost to OWNER.

1.06 RIGHT OF INSPECTION

- A. OWNER and ENGINEER have the right to inspect all storage sites and preventative maintenance records at any time. Immediately correct for any noted deficiencies.
- B. Failure to note a deficiency on part of OWNER or ENGINEER does not relieve responsibility for proper storage and maintenance of materials and equipment.
- C. Payment may be withheld for any products not properly stored.

PART 2 PRODUCTS (NOT USED)**PART 3 EXECUTION (NOT USED)****END OF SECTION**

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 01 71 14
MOBILIZATION AND DEMOBILIZATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: General requirements for the Contract mobilization and demobilization.
- B. Related Sections:
 - 1. Section 01 32 00 – Construction Progress Documentation
 - 2. Section 01 32 36.10 – Video, Temperature & Humidity Monitoring, and Documentation
 - 3. Section 01 33 00 – Submittal Procedures
 - 4. Section 05 05 19 – Post-Installed Concrete Anchors
 - 5. Section 35 22 26 – Slide Gates

1.02 REFERENCES

- A. Definitions:
 - 1. The Bid Items Mobilization and Demobilization includes:
 - a. Transporting to the Work Site and setting up equipment required for the performance of the Work.
 - b. Removing from the Work Site, all equipment mobilized unless specified or approved otherwise by the ENGINEER and/or OWNER in writing to stay behind.
- B. Mobilization and Demobilization do not include:
 - 1. Staff support vehicles, service trucks, fuel trucks, and transport trucks.

1.03 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Conditions and all Supplementary Conditions.
- B. Submit the following to the ENGINEER for reference.
 - 1. Pre-Mobilization Work Plan.
 - 2. List of equipment to be included in the mobilization and demobilization process.

1.04 PRE-MOBILIZATION ACTIVITIES

- A. Pre-mobilization activities may be performed. Acceptable pre-mobilization activities include, but are not limited to the following, and are subject to review and approval by the ENGINEER:
 - 1. Field verification of site conditions, measurements and surveys.

2. Photo and video documentation of existing pre-construction conditions (see Specification Section 01 32 00 – Construction Progress Documentation).
 3. Field locate reinforcing steel using ground penetrating radar (GPR) within the vicinity of the upper gate frame (guide) anchor tabs (see Specification Section 05 05 19 – Post-Installed Concrete Anchors and 35 22 26 – Slide Gates).
 4. Installation of the temporary construction camera (see Specification Section 01 32 36.10 - Video, Temperature & Humidity Monitoring and Documentation).
- B. Notify the ENGINEER at least 14 calendar days prior to pre-mobilization activities and submit to the ENGINEER for review and approval a Pre-Mobilization Work Plan listing all requested activities prior to general mobilization (additional pre-mobilization activities at the request of the CONTRACTOR will be considered).

1.05 GENERAL MOBILIZATION AND DEMOBILIZATION

- A. Notify the ENGINEER at least 14 calendar days prior to mobilization and demobilization.
- B. The equipment shall be complete with accessories and support materials. The equipment shall be completely functional and in good working order.
- C. CONTRACTOR vehicles, equipment and personnel shall remain on established roads or areas designated by the OWNER.

1.06 DEMOBILIZATION FINAL CLEANUP

- A. Upon completion of the Work, decontaminate (if necessary) and remove all materials and equipment brought to the Site.
- B. Leave the Site clear of all debris, including thoroughly sweeping all paved areas.
- C. Remove any temporary fencing that was installed.
- D. Repair any damage to fences, buildings, streets, parking lots, curbs, landscaping, and other property caused by CONTRACTOR's activities.
- E. Decontaminate all equipment, vehicles, or other items prior to removal from the Site.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 01 73 00

EXECUTION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. General procedures and requirements for work execution.

1.02 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and points of connection of utility services.

- B. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

1.03 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for interpretation to the ENGINEER. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

1.04 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings. If discrepancies are discovered, notify the ENGINEER promptly.
 - 1. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 2. Inform installers of lines and levels to which they must comply.
 - 3. Check the location, level and plumb, of every major element as the Work progresses.
 - 4. Notify the ENGINEER when deviations from required lines and levels exceed allowable tolerances.

1.05 FIELD ENGINEERING

- A. Reference Points: Locate existing control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of the ENGINEER. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to the ENGINEER before proceeding.

1.06 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions.

- E. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by the ENGINEER.
 - 2. Allow for structure movement, including thermal expansion and contraction.
- F. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

1.07 CUTTING AND PATCHING

- A. Perform cutting, fitting, and patching required to complete the Work or to:
 - 1. Uncover Work to provide for installation of new Work or the correction of defective Work.
 - 2. Provide routine penetrations of nonstructural surfaces for installation of mechanical, electrical and plumbing work.
 - 3. Uncover Work that has been covered prior to observation by the ENGINEER.
- B. Submit written notification to the ENGINEER in advance of performing any cutting which affects:
 - 1. Work of any other contractor or the OWNER.
 - 2. Structural integrity of any structure or system of the Project.
 - 3. Integrity or effectiveness of weather exposed or moisture resistance structure or systems.
 - 4. Efficiency, operational life, maintenance, or safety of any structure or system.
 - 5. Appearance of any structure of surfaces exposed occasionally or constantly to view.
- C. The notification shall include:
 - 1. Identification of the project
 - 2. Location and description of affected Work.
 - 3. Reason for cutting, alteration, or excavation.
 - 4. Effect on the Work of any separate contractor or OWNER.
 - 5. Effect on the structural or weatherproof integrity of the Project.
 - 6. Description of proposed Work, including:
 - a. Scope of cutting, patching, or alteration.
 - b. Trades that will perform the Work.
 - c. Products proposed for use.
 - d. Extent of refinishing to be performed.
 - e. Cost proposal, when applicable.
 - 7. Alternatives to cutting and patching
 - 8. Written authorization from any separate contractor whose Work would be affected.
 - 9. Date and time Work will be uncovered or altered.

- D. Examine the existing conditions, including structures subject to damage or to movement during cutting or patching.
 - 1. Inspect conditions affecting installation of products or performance of the Work after uncovering the Work.
 - 2. Provide a written report of unacceptable or questionable conditions to ENGINEER. CONTRACTOR shall not proceed with Work until ENGINEER has provided further written instructions. Beginning Work will constitute acceptance of existing conditions by CONTRACTOR.
- E. Protect the structure and other parts of the Work and provide adequate support to maintain the structural integrity of the affected portions of the Work. Provide devices and methods to protect adjacent Work and other portions of the Project from damage. Provide protection from the weather for portions of the Project that may be exposed by cutting and patching Work.
- F. Execute cutting and demolition by methods which will prevent damage to other Work and will provide proper surfaces to receive installation of repairs.
- G. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.
- H. Cut, remove, and legally dispose of selected mechanical equipment, components, and materials as indicated, including but not limited to, the removal of mechanical piping, heating units, plumbing fixtures and trim, and other mechanical items made obsolete by the modified Work.
- I. Restore Work which has been cut or removed to accommodate the new Work but is otherwise intended to remain in place. Install new products to provide completed Work per the Contract Documents.
- J. Fit Work air-tight to pipes, sleeves, ducts, conduit, and other penetrations through the surfaces. Where fire rated separations are penetrated, fill the space around the pipe or insert with materials with physical characteristics equivalent to fire resistance requirements of penetrated surface.
- K. Patch finished surfaces and building components using new products specified for the original installation.
- L. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:
 - 1. For continuous surfaces, refinish to the nearest intersection.
 - 2. For an assembly, refinish the entire unit.

1.08 FIELD MEASUREMENTS

- A. Perform complete field measurements of the dimensions at the site for products required to fit existing conditions prior to purchasing products affected by that measurement or beginning construction.

- B. Verify property lines, control lines, grades, and levels indicated on the drawings.
- C. Verify pipe class, equipment capacities, existing electrical systems and power sources for existing conditions.
- D. Check Shop Drawings and indicate the actual dimensions available where products are to be installed.
- E. Include field measurements in record documents

1.09 SURVEY AND LAYOUT

- A. Provide complete engineering layout of the Work needed for construction.
- B. Provide competent personnel. Provide equipment including accurate surveying instruments, stakes, platforms, tools, and materials.
- C. Survey accuracy is to meet the requirements for preparation of record drawings established for Category 5 Construction Surveying as established in the Manual of Practice of Land Surveying in Texas published by the Texas Board of Professional Engineers and Land Surveyors, latest revision.
- D. Record data and measurements per Technical Standards.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 01 74 00
CLEANING AND WASTE MANAGEMENT

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. General procedures and requirements for disposal of waste material and Site cleaning.

1.02 REFERENCES

- A. Reference Standards:
 - 1. National Fire Protection Association (NFPA):
 - a. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.

1.03 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
- B. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- C. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- D. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- E. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.
- F. Use only those cleaning products that will not create hazards to health or property and those methods recommended by the Manufacturer on the surfaces to be cleaned. Use

cleaning products only on those surfaces recommended by the cleaning product Manufacturer.

- G. Comply with codes, ordinances, regulations, and anti-pollution laws. Waste materials shall not be burned or buried. Volatile or hazardous waste materials shall not be disposed of in waterways, storm sewers or sanitary sewers.
- H. Transport waste materials in a controlled manner with as few handlings as possible. Materials shall not be dropped from heights.
- I. Frequently remove waste materials, rubbish, scrap metals, and debris caused by operations from the site and legally dispose of these at public or private dumping areas so the Site presents a neat, orderly, and workmanlike appearance.
- J. Control dust from waste materials. Waste materials or debris shall not be allowed to blow off of the site.
- K. Provide positive methods to minimize raising dust from construction operations and provide positive means to prevent airborne dust from discharging into the atmosphere.
- L. Keep buildings in a broom clean state at all times. Continue cleaning on a regular basis until the structure is ready for acceptance.
- M. Control dust and dirt from demolition, cutting, and patching operations.

1.04 WASTE MANAGEMENT

- A. Make arrangements to legally dispose of the refuse, rubbish, scrap materials, and debris caused by operations offsite.
 - 1. Dispose of waste products, trash, debris, and similar materials not required for the performance of the Work.
 - 2. Remove surplus materials, falsework, and other temporary structures.

1.05 SUBMITTALS FOR CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

- A. Submittals shall be in accordance with Contract Documents.
- B. Obtain and submit disposal permits for proposed disposal sites if required by local ordinances.
- C. Submit a copy of written permission from property owner, along with description of property, prior to disposal of excess material adjacent to the Project. Submit a written and signed release from property owner upon completion of disposal Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 EXCESS MATERIAL

- A. Vegetation, rubble, broken concrete, debris, pavement, excess soil and other materials not designated for salvage, shall become the property of Contractor and shall be removed from the Site and legally disposed.
- B. Excess soil may be deposited on private property adjacent to the Project when written permission is obtained from property owner. Verify the flood plain status of any proposed disposal site. Do not dispose of excavated materials in an area designated as within the 100-year Flood Hazard Area.
- C. Waste materials shall be removed from the site on a daily basis, such that the site is maintained in a neat and orderly condition.

3.02 FINAL CLEANING

- A. General: Final cleaning shall apply to the dam facilities and site areas affected by the construction Work and temporary facilities.
- B. Thoroughly clean the affected areas of site and make ready for occupancy.
 - 1. Remove construction debris, boxes, and trash from the site.
 - 2. Remove construction storage sheds and field offices.
 - 3. Restore grade to match surrounding condition and remove excess dirt.
 - 4. Sweep all drives and parking lots clean of dirt and debris. Use water truck or hose down paved site to like new appearance.
- C. Clean affected surfaces and inspect for damage.
 - 1. Remove oil, grease, paint drippings, and other contaminants from surfaces, then mop repeatedly until thoroughly clean. Replace damaged surfaces.
- D. Clean wall surfaces to remove dirt or scuff marks.
- E. Spot paint nicks and other damage. Touch up damaged surfaces on factory finished equipment using special paint furnished by the Manufacturer.
- F. Remove dirt, oil, grease, dust, and other contaminants from equipment and apparatus in mechanical and electrical rooms with vacuum.
- G. Inspect exterior painted surfaces. Spot paint any damaged surfaces.
- H. Clean surfaces of debris; flush drainage systems with water until clear.
- I. Broom clean exterior paved surfaces and rake clean other surfaces of the grounds.

- J. Clean and polish all electrical equipment and exposed conduits. Remove paint overspray. Provide a blemish free appearance on all exposed equipment and conduits.

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 01 75 00
STARTING AND ADJUSTING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. General procedures and requirements starting and adjusting installed equipment.
 - 2. Owner Training.
- B. Related Sections:
 - 1. Section 01 33 00 – Submittal Procedures

1.02 STARTUP PROCEDURES

- A. Work included but not limited to:
 - 1. Provide step-by-step procedures for starting provided systems, including equipment and processes.
 - 2. Provide pre-start up inspections by equipment manufacturers.
 - 3. Provide instruction and demonstration of operation, adjustment, and maintenance of each system and the component parts.
 - 4. Place each system in service and operate the system to prove performance and to provide for initial correction of defects in workmanship, calibration, and operation.
 - 5. Provide for initial maintenance and operation.

1.03 SUBMITTALS FOR STARTUP PROCEDURES

- A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Conditions and all Supplementary Conditions.
- B. Submittals shall include:
 - 1. A Plan of Action for testing, checking, starting and training major equipment and process systems. Submit reports as required by this specification.
 - 2. Equipment Installation Reports.
 - 3. Operation and Maintenance Manuals per the Contract Documents

1.04 STANDARDS

- A. Comply with any standards associated with the testing or start-up of equipment, as listed in the various sections of the Specifications.

1.05 SPECIAL JOB CONDITIONS

- A. Do not start or test any apparatus until the complete unit has been installed and thoroughly checked.

- B. A representative of the Manufacturer shall be in attendance of test and start-up procedures when required by these Specifications.

1.06 INSPECTION AND START-UP

- A. Inspect equipment prior to placing any equipment or system into operation. Make adjustments as necessary for proper operation.
 - 1. Check for adequate and proper lubrication.
 - 2. Determine that parts or components are free from undue stress from structural members, piping or anchorage.
 - 3. Adjust equipment for proper balance and operations.
 - 4. Determine that vibrations are within acceptable limits.
 - 5. Determine that equipment operates properly under full load conditions.
 - 6. Determine that the equipment is in true alignment.
- B. Have the Manufacturer's representative present when the equipment is placed in operation.
 - 1. The representative is to be on site as often as necessary for proper and trouble-free operation.
 - 2. Ensure that the proper procedure is employed in start-up of systems.
- C. Provide Equipment Installation Reports for Equipment
 - 1. Certify that the equipment and related appurtenances have been thoroughly examined and approved by ENGINEER and/or Manufacturer for start-up and operation.
 - 2. Include the date when OWNER's personnel were instructed in the proper operation and maintenance of the equipment in the report.

1.07 INITIAL OPERATION

- A. Start, test and place equipment and systems into operation for 30 days to allow the ENGINEER to observe the operation and overall performance of the equipment and to determine that controls function as intended.
- B. Equipment which operates on a limited or part-time basis shall be operated in the presence of the ENGINEER to demonstrate that controls function as specified.
- C. Perform acceptance test as specified in individual specification sections. Demonstrate that equipment and systems meet the specified performance criteria.

1.08 OPERATOR TRAINING

- A. Provide instruction and demonstration of the care and operation of the equipment to the OWNER's personnel. Instruction is to include classroom and hands-on training.
- B. Provide training in adequate detail to ensure that the trainees who complete the program will be qualified and capable of operating and maintaining the equipment, products, and systems provided.

- C. Operations Training is to include but not be limited to the following:
1. Orientation to provide an overview of system/subsystem configuration and operation
 2. Terminology, nomenclature, and display symbols.
 3. Operations theory
 4. Equipment appearance, functions, concepts, and operation.
 5. Operating modes, practices and procedures under normal, diminished, and emergency conditions
 6. Start-up and shutdown procedures
 7. Safety precautions
 8. On-the-job operating experience for monitoring functions, supervisory, or command activities. Include functions and activities associated with diminished operating modes, failure recognition, and responses to system/subsystem and recovery procedures.
- D. Provide training for performing on-site routine, preventive, and remedial maintenance of the equipment, product, or system. Maintenance Training is to include but not be limited to:
1. Orientation to provide an overview of system/subsystem concept, configuration, and operation.
 2. Operations theory and interfaces.
 3. Instructions necessary to ensure a basic theoretical and practical understanding of equipment appearance, layout and functions.
 4. Safety Precautions.
 5. Use of standard and special tools and test equipment.
 6. Adjustment, calibration, and use of related test equipment.
 7. Detailed preventive maintenance activities.
 8. Troubleshooting, diagnostics, and testing.
 9. Equipment assembly and disassembly.
 10. Repair and parts replacement.
 11. Parts ordering practices and storage.
 12. Failure and recovery procedures.
 13. Cabling and/or interface connectors.
 14. Content and use of Operation and Maintenance manuals and related reference materials.
 15. Procedures for warranty repairs.
 16. Lubrication.
 17. Procedures, practices, documentation, and materials required to commence system maintenance.
- E. Provide a training plan that indicates the schedule and sequence of the training programs. The training plan is to include for each course:
1. Number of hours for the course.
 2. Agenda and narrative description, including the defined objectives for each lesson.
 3. Draft copy of training handbooks.
 4. A descriptive listing of suggested reference publications.

5. Audio-visual equipment required for training.
 6. Type and number of tools or test equipment required for each training session.
- F. Provide and use training aids to complement the instruction and enhance learning.
1. Provide training handbooks for use in both the classroom and the hands-on phases of training for each course.
 2. Instructional materials shall include references to the Operation and Maintenance Manuals and identify and explain the use of the manual.
 3. Provide a copy of all audio/visual training materials used in the presentations.
- G. Provide qualified instructors to conduct the training.
1. Instructors must have knowledge of the theory of operation and practical experience with the equipment, product, or system.
 2. Instructors must have successfully conducted similar training courses.
- H. Training may be recorded by the OWNER or ENGINEER for use in future training. Provide legal releases or pay additional fees required to allow training by the manufacturer to be recorded.
- I. Schedule for training and start-up assistance shall be approved by ENGINEER.
1. Schedule training and start-up operations for no more than one (1) piece of equipment or system at a time.
 2. ENGINEER may require re-scheduling of training if operations personnel are not available for training on a scheduled date.
 3. Provide a minimum of two (2) weeks notice if training must be rescheduled.
 4. Training is to be limited to 24 hours per week.
 5. Time required for training is to be considered in the development of the Project schedule.
- J. Schedule and coordinate training for equipment, products, or systems which depend upon other equipment or systems for proper operation so that trainees can be made familiar with the operation and maintenance of the entire operating system.
- K. Maintain equipment until Final Completion of the Project is achieved.
1. Ensure that mechanical equipment is properly greased, oiled, or otherwise cared for as recommended by the Manufacturer.
- L. Service equipment per the Manufacturer's instructions immediately before releasing the equipment to the OWNER.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

April 2021

Brazos River Authority
De Cordova Bend Dam

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 01 77 00
CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. General procedures and requirements for project closeout.
- B. Related Sections:
 - 1. Section 01 33 00 – Submittal Procedures
 - 2. General Conditions Article 14.07 – Final Payment
 - 3. Supplementary Conditions SC-165

1.02 PROCEDURES

- A. Substantial Completion; Final Inspection; and Final Completion:
 - 1. See General Conditions Article 14– Payments to Contractor and Completion, as amended by the Supplementary Conditions.

1.03 Final Paperwork:

- A. Prior to final payment, CONTRACTOR shall deliver to the ENGINEER and receive acceptance by the ENGINEER and/or OWNER of the following items:
 - 1. CONTRACTOR's written guarantee of materials and workmanship.
 - 2. All subcontractor and vendor waivers and releases of liens
 - 3. All guarantees, warranties, and submittals, as specified.
 - 4. Receipts for extra materials and/or spare parts delivered to OWNER.
 - 5. Final payment request.
 - 6. All required indemnifications.
 - 7. All other required closeout documents.

1.04 FINAL PAYMENT REQUEST

- A. The Final Application for Payment request shall include adjustments to the Contract Amount for:
 - 1. Approved Change Orders
 - 2. Allowances not previously adjusted by Change Order
 - 3. Unit prices
 - 4. Deductions for defective Work that have been accepted
 - 5. Penalties and bonuses
 - 6. Deductions for liquidated damages
 - 7. Deductions for reinspection payments
 - 8. Other adjustments

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PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 01 78 00
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Procedural requirements for the preparation and submittal of the following:
 - a. Contract Record Documents.
 - b. Operation and maintenance data required by other Specification Sections.
 - c. Warranties and bonds.
- B. Related Requirements:
 - 1. Section 01 33 00 – Submittal Procedures.

1.02 REFERENCES

- A. Abbreviations and Acronyms:
 - 1. CQA: Contractor's Quality Assurance.
 - 2. NOT: Notice of Termination.
 - 3. O&M: Operation and Maintenance.
 - 4. RFI: Request for Interpretation.
 - 5. RFS: Requests for Substitution.
- B. Definitions:
 - 1. Contract Record Documents: Also referred to as Project Record Documents and As-Built, required documents which show the Work of the Contract as actually installed, placed, erected, and applied prior to final completion and acceptance of the Work performed under this Contract.

1.03 PERFORMANCE REQUIREMENTS:

- A. Contract Record Documents:
 - 1. Maintain the following current and comprehensive records and documentation relating to the Work to be performed under this Contract:
 - a. Contract Documents:
 - 1) Contracting Requirements including the Agreement, bonds, certificates, and Conditions of the Contract.
 - 2) Contract Specifications.
 - 3) Contract Drawings.
 - 4) Pre-contract proposals and revisions, such as Addenda.
 - 5) Contract clarifications, proposals, and modifications, such as Change Orders and Field Orders.
 - b. Subcontracts.
 - c. Purchase Orders.
 - d. Reviewed Shop Drawings, Product Data, and Samples.

- e. Employment records as required by law.
 - f. Field test records.
 - g. Inspection certificates.
 - h. Manufacturer's certificates.
 - i. Manufacturer's instructions for assembly, installation, and adjustment of their products provided under this Contract.
 - j. Quality control documents.
 - k. Survey notes
2. Record Set of Drawings and Specifications:
- a. Maintain a Record Set of the Contract Drawings; Specifications; Shop Drawings; and the Baseline, Recovery, and Update Construction Schedules at the Site specifically dedicated to indicating and recording the actual construction performed under the Contract.
 - 1) As the construction progresses, concurrently keep this Record Set current by legibly marking its drawings and specifications to show and record the actual construction performed.
 - a) In the Record Specifications, insert a legible written description of each actual product installed next to the place in the appropriate Specification Section where the product is specified.
 - (1) Include the product manufacturer's name and model number, product substitutions or alternates used, and changes made.
 - b) On the Record Set of Contract Drawings and Shop Drawings, legibly mark each appropriate item to indicate and record the actual construction as completed:
 - (1) Changes to the dimensions indicated on the original drawings.
 - (a) Indicate field changes to dimensions and details.
 - (2) Revisions to details on the original drawings.
 - (3) Revisions to piping and conduit routing indicated on the original drawings.
 - (4) Measured locations of utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - (5) Revisions to electrical circuitry.
 - (6) Actual equipment locations.
 - (7) New details not shown on the original Contract Drawings.
 - c) Indicate changes made.
 - (1) Annotate Contract Record Documents with the Addendum, Field Order, Request for Interpretation (RFI), Requests for Substitutions (RFS), or Change Order numbers as required to identify the source of the changes.
 - 2) Ensure that all entries are complete and accurate for future reference by the OWNER.
 - 3) Record the information concurrently with construction progress.
3. Final Reports/Documents:
- a. Prepare the following final reports and documents, and submit them to the ENGINEER at Project Closeout:

- 1) Final Construction Report which shall include CONTRACTOR-controlled activities in accordance with the requirements of the Contract Documents, CONTRACTOR's Quality Assurance (CQA plan) Plan and any permits, and, at minimum, the following:
 - a) Summary of construction.
 - b) Change orders.
 - c) Requests for substitutions (RFS).
 - d) Requests for information (RFI).
 - e) All Material testing results performed during construction, including but not limited to the following materials.
 - (1) Concrete.
 - (2) Grout.
 - (3) Steel.
 - f) Daily reports.
 - g) Weather monitoring reports.
 - h) Startup, testing and commissioning reports.
 - i) Meetings and other correspondence.
 - j) Photographs and videos.
 - k) Final inspection punch list.
 - l) Permit closure documents (e.g. Notice of Termination (NOT) and others).
 - m) Warranties.
- 2) Construction Progress Schedules.
- 3) Notice of Final Completion.
- 4) Final meter readings where applicable.
4. Store the Contract Record Documents separately from the documents used for construction.
5. Submit all Contract Record Documents with the Final Application for Payment.

B. Operation and Maintenance Data:

1. Operation and Maintenance Manuals:
 - a. Prepare Operation and Maintenance (O&M) Manuals for equipment or systems as follows when these manuals are specified in other Specification Sections:
 - 1) Have personnel experienced in the maintenance and operation of the described products prepare the instructions and data.
 - 2) Prepare the information in the form of an instructional manual.
 - b. Operation and Maintenance (O&M) Manual Contents:
 - 1) Table of Contents:
 - a) Prepare a Table of Contents for each Operation and Maintenance (O&M) Manual volume.
 - b) Identify each product or system included in the Manual.
 - 2) Organize the information in each Operation and Maintenance (O&M) Manual in 3 Parts as follows:
 - a) Part 1 – Directory:
 - (1) List the names, addresses, telephone numbers, and other contact information of the ENGINEER, the CONTRACTOR,

Subcontractors, and major equipment manufacturers and Suppliers in this Part.

- b) Part 2 - Operation and Maintenance Instructions:
 - (1) Arrange and organize the information in this Part by system, by progressive process flow, and/or by grouping similar products together; and subdivide and categorize the information in this Part by the Specification Section in which the included products, equipment, and systems are specified.
 - (a) In each subdivision, identify the names, addresses, and telephone numbers of the Subcontractors and Suppliers of the products, equipment, and systems included in the subdivision.
 - (2) Include the following information for each item as appropriate:
 - (a) Significant design criteria.
 - (b) List of equipment.
 - (c) Parts list for each equipment or system component.
 - (d) Operating instructions.
 - (e) Maintenance instructions for the equipment and/or systems.
 - (f) Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 - c) Part 3 - Project Documents and Certificates:
 - (1) Include the following Project documents and certificates in this Part organized like the information for O&M Manual Part 2 above:
 - (a) Shop Drawings and Product Data.
 - (b) Certificates.
 - (c) Warranties and Bonds:
 - i. Include photocopies of each warranty and bond, and index each separately in the Table of Contents.
- 2. Bind the operation and maintenance data in commercial quality, 8-1/2-inch by 11-inch binders each with a durable plastic cover and three "D" side rings.
 - a. If multiple binders are required, correlate the data into related, consistent groupings.
 - 3. Identify each Operation and Maintenance (O&M) Manual binder on the cover with the typed or printed title "OPERATION AND MAINTENANCE INSTRUCTIONS"; the title and number of the PROJECT and Contract; the name, address, and telephone number of the CONTRACTOR; and the subject matter of binder's contents.
 - 4. Include a neatly typed Table of Contents in each Operation and Maintenance (O&M) Manual binder that identifies the component, system, or product by name; includes the number and title of the Specification Section in which it was specified; and is organized in the same sequence appearing in the Table of Contents of the Project Manual.
 - a. Provide a listing in the Table of Contents for design data and furnish a tabbed fly sheet followed by space for insertion of design data.

5. Provide full operation and maintenance data, using typed or printed descriptions of the products and major component parts of equipment as necessary.
 - a. Furnish the manufacturer's printed or typewritten information.
 - 1) Mark each sheet to clearly identify specific products and component parts, and data applicable to installation.
 - 2) Delete inapplicable information.
 - 3) Use typed text on 20-pound paper as required to supplement the manufacturer's published Product Data.
 - b. Separate each separate product or system with index tab sheets keyed to its Table of Contents listing.
 - 1) List each Subcontractor, Supplier, and manufacturer affiliated with the product or system; include the name, address, and telephone number of the responsible principal associated with each; and include a local source of supplies and replacement parts.
 - c. Furnish the following for each product, system, applied material, finish, and equipment item as applicable:
 - 1) Furnish a logical sequence of instructions for each procedure, and incorporate the manufacturer's Product Data, drawings, and instructions where appropriate.
 - 2) Furnish the following Product Data for each unit or system as applicable:
 - a) Unit or system description listing the component parts.
 - (1) Furnish catalog numbers, sizes, components or composition, and color and texture designations.
 - b) Identification of the function, normal operating characteristics, and limiting conditions.
 - c) Performance curves, with engineering data and tests.
 - d) As-installed control diagrams from the controls manufacturer.
 - e) Operating procedures, including start-up, break-in, and routine normal operating instructions and sequences.
 - (1) Include regulation, control, stopping, shut-down, and emergency instructions.
 - (2) Include the sequence of operation from the controls manufacturer.
 - (3) Include summer, winter, and any special operating instructions.
 - f) The CONTRACTOR's coordination drawings, including color coded piping diagrams as installed.
 - g) Valve Tag Number Charts giving the location and function of each valve keyed to flow and control diagrams.
 - h) Test and balancing reports.
 - i) Complete nomenclature and model numbers of replaceable parts.
 - j) A list of applicable reference standards, chemical compositions, and details of installation.
 - (1) Information for moisture protection and special requirements for weather-exposed products.
 - k) For products and equipment having electrical systems, furnish the following:

- (1) Panelboard circuit directories.
 - (2) Information for the system's electrical service characteristics, controls, and communications.
 - (3) Color-coded wiring diagrams for the equipment as installed.
 - 1) Additional information as specified in individual product Specification Sections.
 - 3) Provide drawings to supplement Product Data that illustrate the relationship of component parts of equipment and systems and show control and flow diagrams.
 - a) Bind drawings with the text using reinforced punched binder tabs.
 - b) Fold larger drawings to the same size as text pages.
 - c) Do not use Project Record Documents or maintenance drawings to fulfill this requirement.
 - d. Instructions for Care and Maintenance:
 - 1) Furnish recommendations for inspections, maintenance, and repair, including the manufacturer's printed operation and maintenance instructions and the original manufacturer's parts lists, illustrations, assembly drawings, and diagrams required for maintenance
 - a) Furnish procedures and guides for routine preventative maintenance and troubleshooting, disassembly, repair, and reassembly instructions.
 - b) Furnish alignment, adjusting, balancing, and checking instructions.
 - c) Furnish the servicing and lubrication schedule, and a list of lubricants required.
 - d) Furnish a list of the original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
 - 2) Furnish the manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and the recommended schedule for cleaning and maintenance of the item.
 - e. Provide information for re-ordering custom manufactured products.
 - f. Furnish additional information as specified in individual product Specification Sections.
6. As a condition of Substantial Completion, submit the Contract Record Documents, the Shop Drawing prints, and the manufacturer's warranties for review and comment.
- a. Include the original copy of the Contract Record Drawings with changes from the original Contract Documents marked during the construction period using erasable red colored pencil.
 - 1) Clearly mark each drawing as "As-Built Document".
 - b. If no deficiencies or omissions are discovered, the ENGINEER will send-a notice of approval of the Contract Record Documents to the CONTRACTOR.
 - c. If deficiencies or omissions are discovered, the ENGINEER will return comments and the reviewed non-conforming documents to the CONTRACTOR for correction.

- 1) Within 14 Days of receipt of the review comments and the non-conforming documents, submit to the ENGINEER a complete and correct red-lined set of Contract Record Documents which address all of the review comments.

1.04 SUBMITTALS

A. Project Record Documents:

1. Submit the Project Record Documents with the Final Application for Payment, except as specified otherwise.
 - a. Include the following items as Project Record Documents:
 - 1) Record Documentation.
 - 2) Final As-Built documentation.
 - 3) Operation and Maintenance Data.
 - 4) Warranty Documentation.
 - 5) Maintenance Contracts.
 - 6) Notice of Final Completion.
 - 7) Final meter readings where applicable.
2. Contract-required software. Final PLC program shall be provided to the owner after successful project completion and acceptance by the OWNER. Provide an electronic copy and the actual PLC code.
3. Operation and Maintenance Data:
 - a. Before submitting the Operation and Maintenance Manuals, submit 2 copies of a preliminary draft of the proposed formats and an outline of their contents.
 - 1) The ENGINEER will review the draft and return one copy with comments.
 - b. For equipment, or component parts of equipment put into service during construction and operated by the OWNER, submit completed operation and maintenance documents for these items within 10 days after acceptance of the items.
 - c. 15 days prior to the Final Inspection, submit one (1) copy of the completed operation and maintenance documents.
 - 1) This copy will be reviewed and returned after Final Inspection with comments.
 - 2) Revise the content of all operation and maintenance document sets as required prior to final submission.
 - d. Within the 10 days after the Final Inspection, submit 2 sets of the revised operation and maintenance documents in their final form.
 - e. Submit electronic files. Assemble manuals as a single .PDF and compatible with the latest version of Adobe Professional. Addendums and attachments shall not be submitted separately, or in different file formats. In case where CONTRACTOR intends to scan printed manuals or other documentation, a resolution of 300dpi shall be used. Where possible, original electronic version shall be submitted.
4. Warranties:

- a. For equipment or component parts of equipment put into service during construction with the ENGINEER's permission, submit warranty documents within 10 days after acceptance.
- b. Make other warranty submittals within 10 days after the date of Substantial Completion, but prior to the Final Application for Payment.
- c. For items of Work for which acceptance is delayed beyond the date of Substantial Completion, submit the warranty documents within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

1.05 DELIVERY AND ACCEPTANCE REQUIREMENTS

- A. Deliver spare parts, extra stock materials, and tools as specified in individual product Specification Sections prior to Contract Closeout.
 1. Notify the ENGINEER at least 10 days prior to the delivery date of each of these items so the items can be directed to the proper location and can be inspected and logged as received.

1.06 WARRANTIES

- A. Manufacturer Warranties:
 1. Obtain warranties, executed in duplicate by the responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable warranted item of Work.
 - a. Except for items put into use with the ENGINEER's permission, set the warranty dates based on the Conditions of the Contract.
 - b. Verify that documents are in proper form, contain full information, and are notarized.
 2. Retain original warranties until Project Closeout, and then submit them at that time to the ENGINEER in the Warranty and Bond Manuals as specified herein.
 - a. Co-execute warranties being submitted when required.
- B. Warranty and Bond Manuals:
 1. Bind the original warranties and bonds in commercial quality, 8-1/2 inch by 11-inch, three-ring binders having durable plastic covers.
 2. Identify each warranty binder on the cover with the typed or printed title "WARRANTIES"; the title and number of the Project and Contract; and the name, address, and telephone number of the CONTRACTOR.
 3. Identify each bond binder on the cover with the typed or printed title "BONDS"; the title and number of the Project and Contract; and the name, address, and telephone number of the CONTRACTOR.
 4. Include a neatly typed Table of Contents in each warranty and bond binder that identifies each product or work item by name, includes the number and title of the Specification Section in which it was specified, and is organized in the same sequence appearing in the Table of Contents of the Project Manual.
 5. Provide full warranty and bond information, using separate typed sheets as necessary.

- a. Separate each warranty and bond with index tab sheets keyed to its Table of Contents listing.
- b. List each Subcontractor, Supplier, and manufacturer affiliated with the warranty or bond; and include the name, address, and telephone number of the responsible principal associated with each.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 02 41 00

DEMOLITION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Requirements for demolition work at existing facilities, salvage of identified items and materials and removal of resulting rubbish and debris.
2. In general, the extent of demolition work is as indicated and annotated on the Drawings and as necessary to accomplish new work, and includes:
 - a. Existing slide gates 5 and 6 and related components.
 - b. Existing hydraulic power unit and breather filter unit.
 - c. Existing HPU PLC control panel, and existing power and control cables and conduits.
 - d. Existing center safety rails within the north and south upstream wells.

B. Related Sections:

1. Section 01 33 00 – Submittal Procedures
2. Section 35 22 26 – Slide Gates.

1.02 REFERENCES

A. Definitions:

1. Authority Having Jurisdiction (AHJ): Building Code officials, zoning officials, inspectors, and government and regulatory agencies given the authority to protect the public's health, safety, and welfare.
2. Construction and Demolition Waste: Waste resulting from construction or demolition projects; includes all materials that are directly or indirectly the by-products of construction work or that result from demolition of buildings and other structures, including, but not limited to, paper, cartons, gypsum board, wood, excelsior, rubber, and plastics.

B. Reference Standards:

1. State of Texas
 - a. Texas Health and Safety Code
 - 1) Chapter 361 – Solid Waste Disposal Act.
2. U. S. Government:
 - a. Code of Federal Regulations (CFR):
 - 1) Occupational Safety and Health Administration, Department of Labor (OSHA):
 - a) 29 CFR 1910 Occupational Health and Safety Standards.
 - b) 29 CFR 1926 Safety and Health Regulations for Construction.
 - 2) Environmental Protection Agency (EPA):
 - a) 40 CFR 60 Standards of Performance for New Stationary Sources.

- b) 40 CFR 61 National Emission Standards for Hazardous Air Pollutants.
- c) 40 CFR 62 Approval and Promulgation of State Plans for Designated Facilities and Pollutants.
- d) 40 CFR 63 National Emission Standards for Hazardous Air Pollutants for Source Categories.
- e) 40 CFR 122 EPA Administered Permit Programs: The National Pollutant Discharge Elimination System.
- f) 40 CFR 131 Water Quality Standards.
- b. United States Code:
 - 1) 15 U.S.C. Section 2601 et seq.
 - a) Federal Toxic Substances Control Act, Public Law 99-519, as amended.
 - 2) 33 U.S.C. Section 1251 et seq.
 - a) Water Quality Act of 1987, Public Law 100-4.
 - b) Clean Water Act of 1977, Public Law 95-217.
 - c) Federal Water Pollution Control Act Amendments of 1972, Public Law 95-500.
 - 3) 42 U.S.C. Section 6901 et seq.
 - a) Resource Conservation and Recovery Act (RCRA), Public Law 94-580.
 - 4) 42 U.S.C. Section 7401 et seq.
 - a) Clean Air Act, as amended by Public Law 101-549, 104 Stat. 2399.95-95.

1.03 SYSTEM DESCRIPTION

- A. Performance Requirements: The demolition work specified in this Section is not intended to be performed as a total wrecking operation but selective demolition as preparatory work relative to the performance of various construction operations in the Project.

1.04 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Provisions and all Supplementary General Provisions.
 - 1. Gate Removal Plan describing the proposed means and methods for removing the existing slide gate.
 - 2. HPU Removal Plan describing the proposed means and methods for disconnecting and removing the existing HPU (including the control panel).

1.05 PROJECT/SITE CONDITIONS

- A. Existing Conditions: The information presented on the Drawings is based on visual field examination of the site and review of existing record documents. While the information provided is believed to be correct, no assurance is implied relative to its

total completeness or accuracy. Report discrepancies to ENGINEER before disturbing existing installations.

1. The Drawings are intended to indicate the general nature of the demolition work required. Every facility appurtenant to those items designated for removal may not be indicated. Field verify dimensions, quantity, type, material, location, means of anchorages and support, interconnection with other facilities, and other pertinent characteristics of facilities which are to be removed or demolished to accommodate new facilities.
2. The CONTRACTOR hereby distinctly agrees that neither the OWNER, or ENGINEER is responsible for the correctness or sufficiency of the information given and after the CONTRACTOR's own Site Investigation will have no claim for delay or extra compensation or damage against the OWNER or ENGINEER on account of the information given; and will have no claim for relief from any obligation or responsibility under the Contract with respect to the above stated stipulations.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Temporary Barriers: Materials needed or required for temporary protection in the form of barricades, fences, enclosures, cofferdams, etc., may be pre-used construction materials of sound condition and reasonably clean. However, the condition of these materials shall meet or exceed the requirements of governing agencies or approving bodies as may be involved with the work.
- B. Equipment: Equipment, machinery and apparatus, motorized or otherwise, used to perform the demolition work may be as chosen at the CONTRACTOR's discretion, but which will perform the work within the limits of the Contract requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Field Inspection: Prior to performance of the actual work, carefully inspect the sites of the indicated and annotated demolition work and locate those objects and structures designated to be demolished and removed.
 1. Verify with the ENGINEER the objects and structures to be demolished and removed.
- B. Utilities: Locate existing exposed, concealed and/or buried active utilities and determine the requirement for their protection, or their disposition with respect to the demolition work.

3.02 PREPARATION

- A. Protection: Take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the OWNER. This includes limiting

vibrations that may cause damage to existing items. Repair or replace any damaged items at the CONTRACTOR's expense.

- B. Exterior Dust Control: To prevent unnecessary spread of dust during performance of exterior demolition work, thoroughly moisten the work surfaces and debris as required to prevent dust being a nuisance to the public, neighbors and concurrent performance of other work on the site. Provide water for use in dust control.
- C. Interior Dust Control: To prevent spread of dust during performance of the interior demolition work, erect and maintain a dust tight temporary enclosure surrounding the areas of demolition. Fabricate such temporary enclosure from impervious materials such as plywood or sheet polyethylene supported on rough carpentry framing.
- D. Protection During Demolition: Exercise care during demolition work to confine demolition operations to the areas as indicated on the Drawings. The physical means and methods used for protection are at the CONTRACTOR's option. However, the CONTRACTOR shall be completely responsible for replacement and restitution work of whatever nature at no increase in Contract Price.
 - 1. Public Safety: If public safety is endangered during the progress of the demolition work, provide adequate protective measures to protect public pedestrian and vehicular traffic on streets and walkways.
 - 2. Facility Safety: If facility personnel are endangered during the progress of the demolition work, provide adequate protective measures to protect persons and vehicular traffic on the facility roadways and walkways.
 - 3. Barriers: Signs, signals and barricades used shall conform to requirements of Federal, State and local laws, rules, regulations, precautions, orders and decrees.

3.03 PERFORMANCE

- A. Existing Slide Gates Removal: Removal of the existing slide gates is a means and methods operation. The CONTRACTOR is responsible for verifying and accounting for the condition of the gate and verifying existing conditions and dimensions of all items related to the gate removal. The gates have been submerged and as a result may have experienced corrosion.
- B. Existing HPU Removal: Removal of the existing HPU and breather filter unit is a means and methods operation. The CONTRACTOR is responsible for verifying existing conditions; deenergizing; disconnecting from existing electrical, communications and piping; removing from existing floor anchors; collecting and disposing of existing hydraulic fluid; and other incidental work.
- C. Existing Center Safety Rails Removal: Removal of the existing center safety rails and supporting equipment in the north and south upstream wells (Gates 5 and 6) is a means and methods operation.
- D. General Requirements: The means and methods of performing demolition and removal operations are the sole responsibility of the CONTRACTOR. However,

equipment used, and methods of demolition and removal will be subject to approval of the ENGINEER.

- E. Salvage: The OWNER has the right to claim as salvage, any items and materials permanently removed under the work of this Section. Should such right of salvage be exercised by the OWNER, move and neatly store removed items on the site in a location agreeable to the OWNER, in a manner approved by the ENGINEER. CONTRACTOR is responsible for maintaining the equipment in its existing condition and adequately protecting it during removal until the time it is provided to the OWNER.
- F. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations.
- G. Waste Management:
 - 1. Do not allow demolished materials to accumulate onsite. Containerize or otherwise store debris as work is in progress and/or dispose of demolished items and materials promptly.
 - 2. Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain OWNER property, remove demolished materials from Site, and legally dispose of them in an EPA-approved landfill.
 - a. Comply with hauling and disposal regulations of the Authorities Having Jurisdiction (AHJ).
 - b. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Dispose of demolition debris off Site in a lawful manner.
 - 4. Hazardous Waste Landfill Records:
 - a. Maintain documentation indicating the receipt and acceptance of the hazardous wastes by a landfill facility licensed to accept hazardous wastes for the record.
 - 5. Burning debris on the Site is not permitted.

3.04 REPAIR / RESTORATION

- A. Restore adjacent areas to the conditions existing prior to the start of the demolition work.
- B. Use the same trade which originally constructed items that have been damaged to patch or repair these items at no increase in the Contract Price.
- C. Repair all damage to existing underground and overhead utilities, services, and improvements caused by demolition or other operations; whether or not such utilities, services, and improvements are indicated on the Contract Drawings.
 - 1. Commence and complete the work to repair damaged utilities as soon as practicable.

April 2021

Brazos River Authority
De Cordova Bend Dam

END OF SECTION

REV. NO.	DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 05 05 19
POST-INSTALLED CONCRETE ANCHORS

PART 1 GENERAL

1.01 SUMMARY

- A. The work specified in this Section consists of drilled in concrete anchors.
- B. Related Work
 - 1. General Provisions and Supplementary General Provisions
 - 2. Section 09 90 00 – Painting
 - 3. Section 35 22 26 – Slide Gates
 - 4. Section 41 24 26 – Hydraulic Power Unit

1.02 REFERENCES

- A. Reference Standards
 - 1. American Concrete Institute:
 - a. ACI 350R – Code Requirements for Environmental Engineering Concrete Structures and Commentary.
 - 2. American Society for Testing and Materials (ASTM):
 - a. ASTM F593-17 – Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - b. ASTM F594-09(2020) – Standard Specification for Stainless Steel Nuts.
 - 3. International Code Council (ICC) Evaluations Services Report:
 - a. ICC-ESR-3814 – Evaluation Report.

1.03 SUBMITTALS

- A. Submit documentation as required to the ENGINEER in accordance with Section 01 33 00, Submittal Procedures, the requirements of the General Provisions and all Supplementary General Provisions:
 - 1. Field-Located Reinforcing Plan.
 - 2. Product specifications with recommended design values and physical characteristics for epoxy dowels, expansion and undercut anchors.
 - 3. Samples: Representative length and diameters of each type anchor shown on the Drawings.
 - 4. Quality Assurance Submittals:
 - a. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 - 5. Manufacturer's installation instructions.
 - 6. Current Approved ICC Evaluation Reports for all expansion and adhesive anchors.
 - 7. Installer Qualifications & Procedures: Submit installer qualifications as stated in Section 1.04.B. Submit a letter of procedure stating method of drilling, the

product proposed for use, the complete installation procedure, manufacturer training date, and a list of the personnel to be trained on anchor installation.

B. Closeout Submittals: Submit the following:

1. Record Documents: Project record documents for installed materials including as-built final anchor locations in accordance with Section 01 78 00, Closeout Submittals Section.

1.04 QUALITY ASSURANCE

A. Installer Qualifications:

1. Drilled-in anchors shall be installed by a Contractor with at least five years of experience performing similar installations.

B. Installer Training: Conduct a thorough training with the manufacturer or the manufacturer's representative for the installing Contractor on the project. Training to consist of a review of the complete installation process for drilled-in anchors, to include but not limited to:

1. Hole drilling procedure
2. Hole preparation & cleaning technique
3. Adhesive injection technique & dispenser training / maintenance
4. Bolt preparation and installation
5. Proof loading/torquing

C. Certifications: Unless otherwise authorized by the ENGINEER, anchors shall have one of the following certifications:

1. ICC ES Evaluation Report indicating conformance with current applicable ICC ES Acceptance Criteria.

1.05 DELIVERY, STORAGE AND HANDLING

A. General:

1. Store anchors in accordance with manufacturer's recommendations.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fasteners and Anchors:

1. Stainless Steel Bolts, Hex Cap Screws, and Studs: Type 316 ASTM F593.
2. Stainless Steel Nuts: Type 316 ASTM F594.

2.02 DRILLED-IN ANCHORS

A. Use of Fast-Setting Epoxies is expressly prohibited.

- B. Cartridge Injection Adhesive Anchors: Threaded steel rod complete with nuts, washers, polymer or hybrid mortar adhesive injection system, and manufacturer's installation instructions. Type and size as indicated on Drawings.
1. Exterior Use: As indicated on the Drawings and Specifications, provide stainless steel anchors. Stainless steel anchors shall be AISI Type 316 stainless steel provided with stainless steel nuts and washers of matching alloy group and minimum proof stress equal to or greater than the specified minimum full-size tensile strength of the externally threaded fastener. All nuts shall conform to ASTM F594 unless otherwise specified. Avoid installing stainless steel anchors in contact with galvanically dissimilar metals.
 2. Acceptable Manufacturer:
 - a. Hilti HAS threaded rods with HIT-RE 500 V3 Safe Set System using Hilti Hollow Drill Bit and VC 150/300 vacuum System for anchor and rebar anchorage to concrete, ICC ESR-3814.
 - 1) www.hilti.com.
 - b. Or approved equal.

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect work to receive anchors for deficiencies which would prevent proper execution of the finished work. Do not proceed with placing until such deficiencies are corrected to the satisfaction of the ENGINEER.

3.02 PREPARATION

- A. Field Locate Existing Reinforcing:
1. The CONTRACTOR shall field locate reinforcing steel using ground penetrating radar (GPR) within the vicinity of the upper gate frame (guide) anchor tabs and submit a dimensioned plan of the field-located reinforcing.

3.03 INSTALLATION

- A. Anchoring into Existing Concrete:
1. Select the appropriate equipment for pre-drilling through the cast-iron thimble.
 - a. Prepare and coat any uncoated cast iron prior to anchor installation. See Specification Section 09 90 00 – Painting.
 - b. Caution, do not continue the drilled thimble hole diameter into the concrete.
 2. Drill holes in the reinforced concrete with rotary impact hammer drills using carbide-tipped bits or star bits. Core drilling will not be permitted.
 3. Drill bits shall be of diameters as specified by the anchor manufacturer.
 4. All holes shall be drilled perpendicular to the concrete surface.
 5. Drill holes for each dowel to the size and depth specified by the anchor manufacturer for the selected anchor size.

6. Do not drill into or cut or otherwise damage existing reinforcement bars without approval by the ENGINEER. If existing reinforcement bars are encountered during the drilling operation, notify the ENGINEER.
 - a. Extra bolt holes are intentionally provided in the gate frame to account for potential reinforcing conflicts. See also Specification Section 35 22 26 – Slide Gates.
7. Clean all holes per manufacturer instructions to remove loose material and drilling dust prior to installation of adhesive.
 - a. Blow clean each finished hole with an oil free air jet and then flush with a jet of clean water.
 - b. Immediately prior to the adhesive injection operation, remove all water from the hole and from the walls of the hole.
8. Inject adhesive into holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
9. Follow manufacturer recommendations to ensure proper mixing of adhesive components.
10. Sufficient adhesive shall be injected in the hole to ensure that the annular gap is filled to the surface.
11. Remove excess adhesive from the surface.
12. Temporarily shim/align anchors with suitable device to center the anchor in the hole and with the gate frame holes.
13. Do not disturb or load anchors before manufacturer specified cure time has elapsed.
14. Observe manufacturer recommendations with respect to installation temperatures for cartridge injection adhesive anchors and capsule anchors.

3.04 REPAIR OF DEFECTIVE WORK

- A. Remove and replace misplaced or malfunctioning anchors. Fill empty anchor holes and patch failed anchor locations with high-strength non-shrink, nonmetallic grout. Anchors that fail to meet proof load or installation torque requirements shall be regarded as malfunctioning.

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 SUMMARY

- A. This Section covers the design, fabrication, and installation of miscellaneous metal fabrications, including steel shapes, plates, and bars.
- B. Related Sections:
 - 1. 01 33 00 – Submittal Procedures
 - 2. 05 05 19 – Post-Installed Concrete Anchors
 - 3. 35 22 26 – Slide Gates
 - 4. 41 24 26 – Hydraulic Power Unit

1.02 REFERENCES

- A. Reference Standards:
 - 1. American Society for Testing and Materials (ASTM):
 - a. ASTM A36/A36M, Standard Specification for Carbon Structural Steel.
 - b. ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - c. ASTM A108, Standard Specification for Steel Bars, Carbon, Cold Finished, Standard Quality.
 - d. ASTM A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - e. ASTM A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - f. ASTM A167, Standard Specification for Stainless and Heat-Resisting Chromium Nickel Steel Plate, Sheet, and Strip.
 - g. ASTM A193/193M-19 – Standard Specification for Alloy-Steel and Stainless- Steel Bolting Materials for High-Temperature Service
 - h. ASTM A240/A240M-20 -Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and General Service.
 - i. ASTM A269/A269M-15a(2019) Standard Specification for Seamless and Welded Stainless Steel Tubing for General Service
 - j. ASTM A276/A276M-17 – Standard Specification for Stainless Steel Bars and Shapes.
 - k. ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - l. ASTM A312/A312M-19 – Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless-Steel Pipe
 - m. ASTM A380-17 – Standard Practice for Cleaning, Descaling, and Passivation of Stainless-Steel Parts, Equipment, and Systems

- n. ASTM A500, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- o. ASTM A570/A570M, Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled.
- p. ASTM A575, Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades.
- q. ASTM A576, Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality.
- r. ASTM B584-14 – Standard Specification for Copper Alloy Sand castings for General Applications
- s. ASTM A967 – Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts
- t. ASTM C1107/C1107M-20 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
- u. ASTM D2000-18 - Standard Classification System for Rubber Products in Automotive Applications (SAE Recommended Practice J200).
- v. ASTM D4020-18 – Standard Specification for Ultra-High-Molecular-Weight Polyethylene Molding and Extrusion Materials.
- w. ASTM F593-17 – Standard Specification for Stainless-Steel Bolts, Hex Cap Screws, and Studs
- x. ASTM F594-09(2020) – Standard Specification for Stainless-Steel Nuts
- y. ASTM A653/A653M-20– Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- z. Special Technical Publication 538 – Cleaning Stainless-Steel
- 2. American Welding Society:
 - a. ANSI/AWS D1.6/D1.6M – Structural Welding Code – Stainless Steel
- 3. Federal Specifications:
 - a. Fed. Spec. FF-S-92a - Screws, Machine: Slotted, Cross Recessed, or Hexagon Head.
 - b. Fed. Spec. FF-S-325 - Shield, Expansion; Nail, Expansion; and Nail, Drive Screw (Devices, Anchoring, Masonry) Group II (Shield, Expansion Bolt Anchor) Type 4 (Wedge expansion anchors) Class 1 (One-piece steel expander with cone taper integral with stud).

1.03 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Provisions and all Supplementary General Provisions.
- B. Shop Drawings and Product Data:
 - 1. Shop drawings shall identify the detail as indicated on the Consultant's Drawings and be complete as to the detail of the product and location in the project, the size of members, the methods of joining various components, the quantity, finish, the location and type of anchors, and necessary measurements.
 - 2. Shop assemblies which require markings for erection identification shall have easy-to-read markings on the shop and erection drawings.

3. Note on shop drawings variations in tolerances or clearances between various products.
4. Use standard welding symbols of the American Welding Society on shop drawings.
5. Furnish setting diagrams, templates, and directions for the installation of metal fabrications.
6. Submit product data on type of finish paint system for both shop painting and field touch-up painting.
7. Submit anchor installer's certification of training completion.

1.04 QUALITY ASSURANCE

- A. Welder Qualifications: Welds shall be made only by welders, tackers, and welding operators who are currently qualified by tests as prescribed in the Structural Welding Code AWS D1.6 of the American Welding Society to perform the type of work required.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store steel above the ground surface on platforms, skids, blocking, or other supports.
- B. Protect from exposure to conditions that produce rust.
- C. Store beams with webs vertical.
- D. Handle and store to prevent contamination, to prevent compromising the stainless-steel passive film and so no parts are bent, broken, or otherwise damaged, and avoid damage to other material and work.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Stainless-Steel Shapes: 316 or 316L
 1. Bar Stock: ASTM A276/A276M-17 Standard Specification for Stainless Steel Bars and Shapes.
 2. Pipe: ASTM A312/A312M-19 Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless-Steel Pipe.
 3. Seamless Tubing: ASTM A269/A269M-15a(2019) Standard Specification for Seamless and Welded Stainless Steel Tubing for General Service.
 4. Shapes: ASTM A276/A276M-17 Standard Specification for Stainless Steel Bars and Shapes.
 5. Sheet and Plate: ASTM A240/A240M-20 Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plates, Sheet, and Strip for Pressure Vessels and for General Applications.
- B. Stainless-Steel Fasteners: 316 or 316L

1. Bolts, hex cap screws and studs: ASTM F593-17 Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
2. Nuts: ASTM F594-09(2020) Standard Specification for Stainless Steel Nuts

2.02 ANCHORS

- A. See Specification Section 05 05 19 – Post-Installed Anchors

2.03 METAL STRUT FRAMING MATERIALS

- A. Metal Strut Framing System: Structural support system with capability to sustain, without failure, imposed loads consisting of channels, angles, tubes, and accessories as recommended by manufacturer for application indicated.
 1. Channels: Cold formed from structural grade steel conforming to ASTM A570, Grade 33, or ASTM A653, Grade 33.
 2. Fittings: Fabricated from steel conforming to ASTM A36, ASTM A575, ASTM A576, or ASTM A635.
 3. Accessories: Manufacturer's standard nuts, bolts, washers, clamps, hangers, plates, fittings, brackets, threaded rod, inserts, splices, and other fabrications as recommended by manufacturer.
- B. Finish components in accordance with one of the following:
 1. Rust-inhibiting acrylic enamel paint, thoroughly baked; conforming to ASTM B117.
 2. Zinc-coated by the hot-dipped process prior to roll-forming, G90 conforming to ASTM A653.
 3. Zinc-coated after all manufacturing, conforming to ASTM A123 or ASTM A153.
- C. Product and Manufacturer:
 1. Unistrut Metal Framing, Unistrut Corporation, Division of Tyco International, Ltd.: www.unistrut.com
 2. Or approved equal.

2.04 GROUT AND ANCHORING CEMENT

- A. Non-shrink, Non-metallic Grout: Premixed, factory-packaged, non-staining, non-corrosive, nongaseous grout complying with ASTM C1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.05 FABRICATION

- A. Fit and shop assemble items in largest practical sections for delivery to site and ready for installation.
- B. Fabricate in accordance with details, approved shop drawings and referenced standards.
- C. Fabricate items with joints tightly fitted and secured.

- D. Drill or punch holes required for the attachment of work of other trades and for bolted connections. Burned holes are not acceptable.
- E. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- F. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- G. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- H. Stainless-Steel welding shall be in accordance with ANSI/AWS D1.6/D1.6M – Structural Welding Code – Stainless Steel
- I. Dress smooth welds and sharp corners.
- J. Make work square, plumb, straight, and true.

2.06 FABRICATION TOLERANCES

- A. Squareness: 1/8-inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16-inch.
- C. Maximum Misalignment of Adjacent Members: 1/16-inch.
- D. Maximum Bow: 1/8-inch in 48-inches.
- E. Maximum Deviation from Plane: 1/16-inch in 48-inches.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect the installed work of other trades and verify that such work is complete to the point where this work may properly commence.

3.02 PREPARATION

- A. Field Measurements: Verify measurements in field before fabrication.

3.03 ERECTION

- A. Erect and install miscellaneous metal and metal fabrications in accordance with details, approved shop drawings and referenced standards aligning straight, plumb and level within a tolerance of one in 200.

- B. Provide suitable temporary braces and stays to hold metal fabrications in position until permanently secured.
- C. Draw threaded bolt connections up tight with lock washers or other means to prevent loosening. Screw fasteners in exposed or finished surfaces may be slot or Phillips head type, but in either case, screws must be countersunk design.
- D. Erect miscellaneous structural steel in accordance with the Drawings, pertinent regulations and referenced AISC standards.

3.04 INSTALLATION

- A. Adhesive Anchor Installation: See Specification Section 05 05 19 – Post-Installed Concrete Anchors.
- B. Install items plumb and level, accurately fitted, free from distortion or defects.
- C. All bolting holes provided in equipment, valves, gates, pipe supports and hangers, and other items which require mounting shall be used as specified and intended.
- D. Allow for erection loads and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- E. Field weld components indicated on Drawings per the appropriate welding code.
- F. The ENGINEER's approval required prior to site cutting or making adjustments not scheduled.

3.05 CLEANING

- A. Stainless-Steel Final Cleaning and Passivation
 - 1. Areas with evidence of contamination, disruption of the passive film and/or surface oxidation shall be properly cleaned and treated at no additional cost to the project in accordance with ASTM A380/A967 and ASTM Special Technical Publication 538.
 - 2. For field cleaning and passivation of stainless-steel items, see the stainless-steel field cleaning and passivation notes on the Drawings.
 - 3. This section applies to both the new and existing stainless-steel components handled and/or compromised in the course of the PROJECT.

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 09 90 00

PAINTING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Requirements for the surface preparation and painting of exposed metals, embedded items and surfaces, including, but not limited to:
 - a. Existing Gates 1 – 6 exposed metal thimbles and frames structural steel (non-stainless-steel).
2. The surface preparation and coating specified in this section are in addition to any shop priming and surface treatment specified in other sections.

B. Related Sections:

1. Section 01 32 36.10 – Video, Temperature, & Humidity Monitoring and Documentation.

1.02 REFERENCES:

A. Definitions

1. Batten: The use of thin strips of solid material, typically wood or plastic, used to protect materials.
2. Blast Cleaning: The cleaning and roughing of a surface by the use of mineral or slag abrasives or, metallic abrasives (grit) which is projected at a surface by compressed air or mechanical means.
3. Build: The wet or dry thickness of an individual coating film.
4. Coverage: Total minimum dry film thickness in mils, or square feet per gallon.
5. HCl: Hydrochloric Acid.
6. Holiday: Any discontinuity, bare or thin spot in a painted area.
7. MDFTTS: Minimum Dry Film Thickness Total System.
8. MDFTPC: Minimum Dry Film Thickness Per Coat.
9. Mil: One-thousandth of an inch. 0.001 inches.
10. MIL-P: Military Specification -Paint.
11. Pot Life: The period of time during which paint remains useful after its original package has been opened or after a catalyst or other additive has been incorporated. Also known as spreadable life or usable life.
12. Primer: The first coat of paint applied to a surface, formulated to have good bonding, wetting and inhabiting properties.
13. PSDS: Paint System Data Sheet.
14. Runs: Sagging and curtaining of a coating or paint film, usually caused by improper thinning, excessive film build or poor application techniques.
15. SFPG: Square Feet Per Gallon.
16. SFPGPC: Square Feet Per Gallon Per Coat.
17. SP: Surface Preparation.
18. SSPC: Society for Protective Coatings.

19. Substrate: The surface to be painted

B. Reference Standards

1. The publications are referred to in the text by basic designation only. The latest edition available on the date of Notice Inviting Bids shall be used.
2. American Society of Testing and Materials (ASTM)
 - a. ASTM B117-19 – Standard Specification for Operating Salt Pray (Fog) Apparatus
 - b. ASTM D520-00(2019) – Standard Specification for Zinc Dust Pigment
 - c. ASTM D2196-18 – Standard Test Methods for Rheological Properties of Non-Newtonian Materials by Rotational Viscountess
 - d. ASTM D4417 – Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel
 - e. ASTM D7091-13 – Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals
 - f. ASTM D7127-17 – Standard Test Method for Measurement of Surface Roughness of Abrasive Blast Cleaned Metal Surfaces Using a Portable Stylus Instrument
3. National Association of Corrosion Engineers (NACE)
 - a. NACE No. 2/SSPC-SP 10 – Near-White Metal Blast Cleaning
 - b. NACE SP0287-2016 – Field Measurement of Surface Profile of Abrasive Blast-Cleaned Steel Surfaced Using a Replica Tape
 - c. NACE SP0716-2016 – Soluble Salt Testing Frequency and Locations on Previously Coated Surfaces
 - d. NACE TM0304 – Offshore Platform Atmospheric and Splash Zone Maintenance Coating System Evaluation
4. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910 – Occupational Health and Safety Standards
 - b. 29 CFR 1926 – Safety and Health Regulations for Construction
5. SSPC: The Society for Protective Coatings (SSPC):
 - a. SSPC SP 1 – Solvent Cleaning
 - b. SSPC SP 2 – Hand Tool Cleaning
 - c. SSPC SP 3 – Power Tool Cleaning
 - d. SSPC SP 10 – Near-White Blast Cleaning
 - e. SSPC SP 11 – Bare Metal Power Tool Cleaning
 - f. SSPC Painting Manual, Volume 1 – Good Painting Practice
 - g. SSPC Painting Manual, Volume 2 – Systems and Specifications
 - h. SSPC PA 1 – Shop, Field and Maintenance Painting of Steel
 - i. SSPC PA 2 – Measurement of Dry Coating Thickness with Magnetic Gages
 - j. SSPC PA Guide 10 – Guide to Safety and Health Requirements for Industrial Painting Projects
 - k. SSPC Technology Guide No. 12 – Guide to Illumination of Industrial Coating Projects
 - l. SSPC PA 17 – Determining Profile Compliance
 - m. SSPC-QP 1 – Field Application to Complex Industrial and Marine Structures.
6. U.S. Military Performance Specification (MIL-PRF)

- a. MIL-PRF 23236 – Coating Systems for Ship Structures

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Review other Specification Sections in which primers or other coatings are provided to ensure compatibility of the total systems for various substrates.
 - a. Upon request, furnish information on the characteristics of specified finish materials to ensure compatible primers.
 - b. Notify the ENGINEER of problems anticipated using the materials specified.

1.04 SUBMITTALS

A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Provisions and all Supplementary General Provisions.

1. Data Sheets:

- a. For each paint system, furnish a Paint System Data Sheet (PSDS), the manufacturer's Technical Data Sheets, and paint colors available (where applicable) for each product used in the paint system. The PSDS form is attached to the end of this section.
- b. Blasting media, solvents, thinners, detergents, etc. approved by the manufacturer that may be used in the process of surface preparation, thinning of material, or cleaning in between layers of coating materials.
- c. Furnish copies of paint system submittals to the coating applicator.
- d. Product data sheets for abrasives media used for surface preparation, along with paint manufacturer's approval of material.
- e. Indiscriminate submittal of manufacturer's literature only is not acceptable.

2. Sample

- a. Unless otherwise specified, before painting work is started, prepare minimum 8- by 10-inch samples with type of paint and application specified on similar substrate to which paint is to be applied.
- b. Furnish additional samples as required until colors, finishes and textures are approved.
- c. Approved samples to be the quality standard for final finishes

3. Quality Control Submittals

- a. Surface Preparation and Coating Application Plan
 - 1) Furnish a Surface Preparation Plan detailing at minimum the following:
 - a) Proposed surface preparation equipment and procedures.
 - b) Abrasive materials to be used along with Product Data sheets.
 - c) Plan and equipment for achieving the minimum required environmental conditions.
 - 2) Provide manufacturer's written instructions and special details for applying each type of paint.
 - 3) Patching, repair and touchup procedures.
- b. Field Quality Control Reports.
 - 1) Furnish daily field quality control reports reporting CONTRACTOR's results of the minimum:

- a) Visual Inspections
 - b) Ambient Conditions
 - c) Field Measurement of Surface Profile of Blast Cleaned Steel
 - d) Coating Thickness
- 2) Paint Manufacturer Field Visit Summary Reports
- 4. Contract Closeout Submittals:
 - a. Warranty.
- 5. Maintenance Material Submittals:
 - a. Extra Stock Materials:
 - 1) Furnish an additional 5 gallons of paint to the OWNER, as appropriate, of each type and color applied.
 - a) Furnish paint from the same production run as materials applied.
 - b) Package this paint in unopened, factory-sealed containers suitable for storage, and identify the containers with labels describing the contents of each.

1.05 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Coating Contractor Experience:
 - a. Minimum 5 years' experience in application of specified products or comparable two-component steel coating product.
 - b. SSPC QP 1 Certification in good standing.
 - 2. CONTRACTOR Quality Control Inspector Experience:
 - a. Minimum 3 years' experience in inspection and testing of coating systems.
 - b. NACE Coatings Inspector Program Level 1 Certification or higher in good standing.
- B. Regulatory Requirements:
 - 1. Meet federal, state, and local requirements limiting the emission of volatile organic compounds.
 - 2. Comply with the Occupational Safety and Health Administration (OSHA) regulations stipulated in 29 CFR 1910 and 29 CFR 1926.
 - 3. Perform surface preparation and painting in accordance with recommendations of the following:
 - a. Paint manufacturer's instructions.
 - b. SSPC PA 1, Shop, Field and Maintenance Painting of Steel
 - c. SSPC PA Guide 10, Guide to Safety and Health Requirements for Industrial Painting Projects
 - d. Federal, state, and local agencies having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver paints in the original unopened containers.
- B. Store products in a protected area that is heated or cooled to maintain temperatures within the range recommended by paint manufacturer.

- C. Shipping:
 - 1. Where pre-coated items are to be shipped to the site, protect coating from damage. Batten coated items to prevent abrasion.
 - 2. Use nonmetallic or padded slings and straps in handling.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply paint in temperatures, humidity, and conditions outside of manufacturer's recommended maximum or minimum allowable, or in dust, smoke-laden atmosphere, damp, wet or humid weather.
 - 1. For the WaterBorne High Ratio Zinc Silicate single-coat system, the more stringent of the manufacturer's minimum specification or the following shall apply:
 - a. Allowable Temperature Range: Min. 40° F - 100° F Max.
 - b. Relative Humidity: Max. 85%
 - c. Dew Point Temperature Range: $\geq 5^{\circ}$ - $\leq 10^{\circ}$
- B. Do not perform abrasive blast cleaning whenever relative humidity exceeds 85 percent, or whenever surface temperature is less than 5 degrees F above dew point of ambient air.
- C. SSPC Technology Guide 12 Guide to Illumination of Industrial Coating Projects. This guide establishes the requirements for illumination during a coatings project. The CONTRACTOR will be required to follow the minimum and recommended levels for lighting in Table 1 (of Guide 12) Work Area Illumination Requirements.

1.08 WARRANTY

- A. Furnish manufacturer's extended guarantee or warranty, with the OWNER named as beneficiary, in writing, as special guarantee. Warranty shall provide for correction, or at the option of the OWNER, removal and replacement of Work specified in this Specification section found *defective* during a period of 2 years after the date of Final Completion.
- B. The CONTRACTOR and paint manufacturer shall jointly furnish the Warranty.

1.09 SOURCE QUALITY CONTROL

- A. Manufacturer's Services:
 - 1. The paint manufacturer's representative shall be present on the site as follows:
 - a. On the first day of the coating applications.
 - b. As required to resolve field problems associated with the manufacturer's product.
 - c. To verify full cure of coating prior to coated surfaces being placed into submerged services.
 - 2. The paint manufacturer shall prepare a Field Visit Summary Report of each visit and the CONTRACTOR shall submit to the ENGINEER.

PART 2 PRODUCTS

2.01 GENERAL

- A. For each coating system, the required surface preparation, prime coat, intermediate coat (if required), topcoat, and coating thicknesses are specified herein. Mil thicknesses shown or specified are minimum dry-film thicknesses. Applied coating thickness shall be in accordance with the specifications.
- B. Material Quality:
 - 1. Manufacturer's highest quality products and suitable for intended service.
- C. Materials Including Primer and Finish Coats:
 - 1. Produced by same manufacturer.
- D. Thinners, Cleaners, Driers, and Other Additives:
 - 1. As recommended by manufacturer of the particular coating.

2.02 MATERIALS

- A. Coating Product:
 - 1. 100% WaterBorne High Ratio Zinc Silicate single-coat system.
 - a. Acceptable Manufacturers:
 - 1) Polyset Company Inc.
PO Box 111
Mechanicville, NY 12118
(518) 664-6000
<https://www.polyset.com>
 - 2) Or approved equal.
 - 2. Color: Grey/Matte
- B. Filler Material:
 - 1. Belzona 1121 (Super XL-Metal) silicon steel alloy two component filler.
 - a. Acceptable Manufacturers:
 - 1) Belzona, Inc.
2000 N.W. 88th Court
Miami, FL 33172
(305) 594-4994
 - b. Or approved equal.
 - 2. Color: Grey/Matte

PART 3 EXECUTION

3.01 EXAMINATION

- A. Surface Preparation Verifications:
 - 1. Inspect and provide substrate surfaces prepared in accordance with these Specifications and the printed directions and recommendations of paint

manufacturer whose product is to be applied. The more stringent requirements shall apply.

3.02 MONITORING

- A. Monitor and record temperature and humidity of the intermediate wells for the duration of the surface preparation and coating work. See Specification Section 01 32 36 – Video, Temperature & Humidity Monitoring and Documentation.

3.03 PREPARATION

- A. Field Abrasive Blasting:
1. Perform blasting for items where specified and as required to restore surfaces previously blasted and primed and/or coated.
- B. Protection of Items not to be Painted:
1. Remove, mask, or otherwise protect hardware, aluminum surfaces, machined surfaces, couplings, shafts, bearings, plastics, rubber, seals, nameplates on machinery, and other surfaces not intended to be painted.
 2. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces.
 3. Protect working parts of gates and mechanical equipment from damage during surface preparation and painting process.

3.04 SURFACE PREPARATION

- A. Prepare all surfaces to be coated in accordance with the paint manufacturer's written specifications and instructions:
- B. The CONTRACTOR shall make provisions and/or adjustments in the surface preparations to account for differences in the materials being prepared and coated.
- C. Test Areas:
1. The CONTRACTOR shall perform surface preparation on a test area of each substrate material for review by the ENGINEER prior to performing surface preparation on the entire surface.
 2. The CONTRACTOR is responsible for correcting any test areas if deemed unacceptable by the ENGINEER.
 3. The CONTRACTOR may use the removed/demolished cast iron gates for cast iron substrate surface preparation test areas.
- D. Where indicated or required by the paint manufacturer, meet requirements of the latest version of the following SSPC Specifications:

Specification¹	Type	Profile (Min. Mils)	Profile (Ave. Mils)
SP 1	Solvent Cleaning	--	--

SP 2	Hand Cleaning	--	--
SP 3	Power Tool Cleaning	--	--
SP 10	Near White Metal Blast Cleaning	1.0	1.0 – 4.0
SP 11	Bare Metal Power Tool Cleaning	1.0	--

1. Note: For cast iron materials where appropriate and approved by the paint manufacturer and the ENGINEER, a substitute standard may apply.

1. Where OSHA or EPA regulations preclude standard abrasive blast cleaning, HydroBlasting, wet or vacuum-blast methods may be required. Coating manufacturers' recommendations for wet blast additives and first coat application shall apply.
2. Round or chamfer sharp edges and grind smooth burrs, jagged edges, and surface defects. Surface profile after execution of this step shall still meet minimum surface profile requirements.
3. Welds and Adjacent Areas:
 - a. Prepare such that there is:
 - 1) No undercutting or reverse ridges on weld bead.
 - 2) No weld spatter on or adjacent to weld or any other area to be painted.
 - 3) No sharp peaks or ridges along weld bead.
 - b. Grind embedded pieces of electrode or wire flush with adjacent surface of weld bead.
4. Pre-blast Cleaning Requirements:
 - a. Remove oil, grease, welding fluxes, and other surface contaminants prior to blast cleaning.
 - b. Cleaning Methods: Steam, open flame, hot water, or cold water with appropriate detergent additives followed with clean water rinsing.
 - c. Clean small isolated areas as above or solvent clean with suitable solvents and clean cloths.
5. Blast Cleaning Requirements:
 - a. Type of Equipment and Speed of Travel: Design to obtain specified degree of cleanliness. Minimum surface preparation is as specified herein and takes precedence over coating manufacturer's recommendations.
 - b. Select type and size of abrasive to produce a surface profile that meets coating manufacturer's recommendations for particular primer/coating product to be used and is compatible with stainless-steel (e.g. does not contaminate stainless-steel surfaces with iron).
 - 1) Do not use steel shot blasting media.
 - 2) Unless otherwise specified by the coating manufacturer, acceptable blasting media is:
 - a) Garnet blasting media;
 - b) Aluminum oxide blasting media; or
 - c) Approved equal.
 - c. Do not reuse abrasive, except for designed recyclable systems.
 - d. Rust inhibitors may be used in conjunction with abrasive blasting as long as it is approved by the paint manufacturer.

- e. Meet applicable federal, state, and local air pollution and environmental control regulations for blast cleaning, confined space entry (if required), and disposition of spent aggregate and debris.
 - 6. Removal of Existing Filler Materials:
 - a. Remove all existing filler material for areas to be coated unless approved by the ENGINEER in writing.
 - 1) For any areas of existing filler material the CONTRACTOR requests to remain:
 - a) The CONTRACTOR shall perform a test patch of coating on the subject area as requested by the ENGINEER.
 - b) The CONTRACTOR is responsible for correcting or removing any test patch areas if deemed unacceptable by the ENGINEER.
 - 7. Post-Blast Cleaning and Other Cleaning Requirements:
 - a. Clean surfaces of dust and residual particles from cleaning operations by dry (no oil or water vapor) air blast cleaning or other method prior to painting. Vacuum clean enclosed areas and other areas where dust settling is a problem and wipe with a tack cloth.
 - b. Paint surfaces the same day/shift they are blasted (and meeting SSPC SP 10). Re-blast surfaces that have started to rust before they are painted.
- E. Surface Preparation Inspection:
- 1. Notify the ENGINEER to conduct an inspection of the prepared surface test area.
 - 2. Prior to application of paint or coating, notify ENGINEER or the ENGINEER's NACE Level 1 representative to conduct an inspection of prepared surfaces to receive paint or coating.

3.05 MIXING

- A. Per Manufacturer's Specifications and Recommendations.
- B. Prepare multiple-component coatings using all of the contents of the container for each component as packaged by the paint manufacturer. Do not use partial batches. Do not use coatings that have exceeded their pot life. Provide small quantity kits for touch-up painting and for painting other small areas. Mix only the components specified and furnished by the paint manufacturer. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating. When power mixing multiple components, do not introduce moisture or air into product.

3.06 APPLICATION

- A. General:
 - 1. The intention of these Specifications is for existing exterior metal surfaces to be painted, whether specifically mentioned or not, except as specified otherwise. Exterior concrete and masonry surfaces will not be painted unless specifically indicated.

2. Apply coatings in accordance with these Specifications and the paint manufacturers' printed recommendations and special details. The more stringent requirements shall apply. Allow sufficient time between coats to assure thorough drying of previously applied paint.
3. Coat units or surfaces to be bolted together or joined closely to structures or to one another prior to assembly or installation.
4. Keep paint materials sealed when not in use.

B. Test Areas:

1. The CONTRACTOR shall perform a coating test area of each substrate material for review by the ENGINEER prior to performing coating on the entire surface.
2. The CONTRACTOR is responsible for correcting any test areas if deemed unacceptable by the ENGINEER.
3. The CONTRACTOR may use the removed/demolished cast iron gates for cast iron substrate preparation and coating test areas.
4. Notify the ENGINEER to conduct an inspection of test area applications.

C. Film Thickness:

1. See attached Coating Schedule.
2. Number of Coats: Minimum required without regard to coating thickness. Additional coats may be required to obtain minimum required paint thickness, depending on method of application, and atmospheric conditions.
3. Maximum film build per coat shall not exceed coating manufacturer's recommendations.
4. Visually inspect metal surfaces to ensure proper and complete coverage has been attained.
5. Give particular attention to edges, angles, flanges, irregularities and other similar areas where insufficient film thicknesses are likely to be present and ensure proper millage in these areas.
 - a. Stripe coating may be required for these areas as recommended by the coating manufacturer.

D. Damaged Coatings, Pinholes, and Holidays:

1. Repair these areas in accordance with written recommendations by the paint manufacturer.
2. Apply coats, including touchup and damage-repair coats in a manner which will present a uniform texture.
3. Repair of damaged galvanized surfaces:
 - a. The galvanized coatings including nuts, bolts and washers damaged during installation shall be repaired.
4. Lubricants shall be removed in accordance with SSPC SP 1.
5. Rust shall be removed in accordance with SSPC SP 10 or SSPC SP 11.
6. The touch-up material shall be compatible with and from the same manufacturer as the coating system to be used for the structure.
7. Subsequent coatings shall be applied within the recoat time recommended by the manufacturer.

E. Operating Parts:

1. Do not paint operating parts unless approved by the equipment manufacturer and supplier.
2. Do not paint operating parts if painting will void or diminish the equipment warranty or system warranty.
3. Operating parts include the moving parts of operating equipment and the following:
 - a. Gates.

F. Labels:

1. Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels, or name, identification, performance rating, or nomenclature plates on equipment.

G. Unsatisfactory Application:

1. If item has an improper finish color, or insufficient film thickness, clean surface with specified paint material to obtain specified color and coverage. Obtain specific surface preparation information from coating manufacturer for those repair procedures.
2. Evidence of runs, bridges, shiners, laps, or other imperfections is cause for rejection.
3. Repair defects in accordance with written recommendations of coating manufacturer.
4. Leave staging and lighting up until the ENGINEER has inspected surface or coating. Replace staging removed prior to approval by the ENGINEER. Provide additional staging and lighting as requested by the ENGINEER.

H. Filler Application:

1. Apply filler material to smooth out pitting, other surface defects and surface irregularities.
2. Apply to pits, surface defects and other surface irregularities larger than 0.23 inches (6mm) deep (from original surface profile).
3. Apply after coating has cured in accordance with the manufacturer's specifications and recommendations.
4. Clean and prepare surface in accordance with the manufacturer's specifications and recommendations.
5. Apply filler in accordance with the manufacturer's specifications and recommendations.

I. Coating Inspection:

1. Notify the ENGINEER to conduct an inspection of test area applications.
2. Prior to application of paint or coating, notify ENGINEER or the ENGINEER's NACE Level 1 representative to conduct an inspection of coating application.

3.07 FIELD QUALITY CONTROL

A. Visual Inspection:

1. Visual quality control inspections shall be performed by the CONTRACTOR's qualified quality control inspector.
2. Perform a visual inspection of each prepared surface in for form of prepared surface area, stains, remnant materials, other detrimental conditions and substrate condition.
3. Perform a visual inspection of each coat to detect defects in form of coverage, holidays, voids, pinholes, blisters and other detrimental conditions.
4. Document visual inspection results.

B. Surface Profile Testing:

1. Surface profile quality control testing shall be performed by the CONTRACTOR's qualified quality control inspector.
2. Perform surface profile testing in accordance with ASTM D4417 (Method C - Replica Tape), NACE SP0287-2016, or ASTM D7127 and per SSPC PA 17. Maintain the same testing method throughout the PROJECT and do not change methods without the approval of the ENGINEER.
 - a. Number of Locations:
 - 1) Minimum of two (2) locations:
 - a) Per surface preparation "apparatus" (i.e. method);
 - b) Per gate thimble/conduit;
 - c) Per work shift or 12 hours of preparation time; and
 - d) Of the two (2) locations (minimum), locate one (1) on a mild steel section and locate the other on a cast iron section.
 - e) As directed by the ENGINEER.
3. If the profile, after blasting, is less than the minimum required, the CONTRACOR will re-blast and re-test the surface until the minimum specified profile depth is achieved.

C. Coating Thickness Testing:

1. Coating thickness testing shall be performed by the CONTRACTOR's qualified quality control inspector.
2. Perform dry coating thickness testing in accordance with SSPC PA 2 and ASTM D7091 using a SSPC Type 2 - Electronic gauge (in mils).
 - a. Acceptable Manufacturers:
 - 1) Elcometer;
 - 2) Defelsko;
 - 3) ElektroPhysik; or
 - 4) Approved equal.
 - b. Number of Locations:
 - 1) Per SSPC PA 2; and
 - 2) Per gate thimble/conduit.
 - 3) As directed by the ENGINEER.
3. Each coat shall achieve the minimum dry film thickness specified, without regards to the overall system thickness.
4. If the coating thickness is less than the minimum required, the CONTRACTOR shall apply additional coats per these specifications and the manufacturer's specifications until the minimum specified minimum thickness is achieved.

D. Daily Coating Inspection Reports:

1. CONTRACTOR shall document quality control inspection and testing results on a Daily Coating Inspection Report and submit to the ENGINEER each day of surface preparation and coating work. Minimum reporting requirements include:
 - a. Project name and number, CONTRACTOR, Subcontractor performing the coating work (if applicable), Inspector name and qualifications, inspection feature description, date, environmental conditions (temperature and humidity), inspections and tests performed and results, and reference specification number(s).
 - b. Visual inspection findings.
 - c. Surface profile test results, including the following minimum information:
 - 1) Test method and standard(s).
 - 2) Equipment used (Model and Serial Number) and calibration information (if applicable).
 - 3) Test locations.
 - 4) Range of location averages.
 - 5) Surface profile measurements.
 - d. Coating thickness test results, including the following minimum information:
 - 1) Test method and standard(s).
 - 2) Equipment used (model and serial number) and calibration information (if applicable).
 - 3) Test locations.
 - 4) Test results.
 - e. Non-conformities.
 - f. Photos.
2. Provide multiple reports as necessary when work for the day includes multiple activities and locations.
3. Submit inspection report format to the ENGINEER for approval.
4. See also sample Daily Coating Inspection Report attached.

3.08 CLEANUP

- A. Place cloths and waste that might constitute a fire hazard in closed metal containers or destroy at the end of each day.
- B. Upon completion of the Work, remove staging, scaffolding, and containers from the site or destroy in a legal manner.
- C. Completely remove paint drips, spills, splashes, spots, oil, or stains upon adjacent surfaces and floors and leave entire job clean.

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

COATING SCHEDULE

A. System No.5 Submerged or Intermittently Submerged Metal (Cast Iron/Carbon Steel):

Final Surface Prep.¹	Paint Material	Cover
Near-White Blast Cleaning (SP 10)	WaterBorne High Ratio Zinc Silicate	6-8 MDFT ²

1. Final surface preparation only. See also Article 3.04 for additional surface preparation specifications.
2. Multiple coats per manufacturer's recommendations may be required. First coats may absorb into porous cast iron areas. Apply additional coats as necessary.

PAINT SYSTEM DATA SHEET

Complete and attach manufacturer's Technical Data Sheet to this PSDS for **each** coating system.

Paint System Number (from Spec.):		
Paint System Title (from Spec.):		
Coating Supplier:		
Representative:		
Surface Preparation:		
Paint Material (Generic)	Product Name/Number (Proprietary)	Min. Coats, Coverage

Project/Client:		Contractor:		Attachments:	
Location:				<input type="checkbox"/> DFT Sheet <input type="checkbox"/> MCR/CAR	
Description:					
Requirements:					
Contractor:		Spec #:		Revision #:	
Description of Areas and Work Performed		Hold Point Inspections Performed			
		<input type="checkbox"/> 1. Pre Surface Preparation/Condition and Cleanliness			
		<input type="checkbox"/> 2. Surface Preparation Monitoring			
		<input type="checkbox"/> 3. Post Surface Preparation/Cleanliness and Profile			
		<input type="checkbox"/> 4. Pre Application Prep/Surface Cleanliness			
		<input type="checkbox"/> 5. Application Monitoring/Wet Film Thickness (WFT)			
		<input type="checkbox"/> 6. Post Application/Application Defects			
		<input type="checkbox"/> 7. Post Cure/Dry Film Thickness (DFT)			
		<input type="checkbox"/> 8. Nonconformance/Corrective Actions Follow-Up			
		<input type="checkbox"/> 9. Final Inspection			
		Approved by:			
Surface Conditions		Ambient Conditions			
<input type="checkbox"/> New <input type="checkbox"/> Maint <input type="checkbox"/> Primer/Paint <input type="checkbox"/> Age/Dry/Cure _____		Time (Indicate AM or PM) _____ : _____ : _____			
<input type="checkbox"/> Steel <input type="checkbox"/> Galvanize <input type="checkbox"/> Concrete <input type="checkbox"/> Other _____		Dry Bulb Temp° (C/F) _____ ° _____ ° _____ ° _____ °			
<input type="checkbox"/> Hazard _____ <input type="checkbox"/> Sample Report # _____		Wet Bulb Temp° (C/F) _____ ° _____ ° _____ ° _____ °			
<input type="checkbox"/> Degree of contamination: _____		% Relative Humidity _____ % _____ % _____ % _____ %			
Test: <input type="checkbox"/> Cl _____ µg/cm² (µs/cm) <input type="checkbox"/> Fe _____ ppm <input type="checkbox"/> pH _____		Surface Temp° (C/F) Min/Max _____ / _____ ° _____ / _____ ° _____ / _____ ° _____ / _____ °			
<input type="checkbox"/> Degree of Corrosion: _____		Dew Point Temp° (C/F) _____ ° _____ ° _____ ° _____ °			
<input type="checkbox"/> Scale <input type="checkbox"/> Pitting/Holes <input type="checkbox"/> Cracks <input type="checkbox"/> Sharp Edges		Wind Direction/Speed _____			
<input type="checkbox"/> Weld _____ <input type="checkbox"/> Moisture <input type="checkbox"/> Oils <input type="checkbox"/> Other _____		Weather Conditions _____			
<input type="checkbox"/> Painted Surface Condition: _____		Application			
Dry to: <input type="checkbox"/> Touch <input type="checkbox"/> Handle <input type="checkbox"/> Recoat		Start Time: _____ Finish Time: _____ Est Sq Ft: _____			
<input type="checkbox"/> Dry/Over Spray <input type="checkbox"/> Runs/Sags <input type="checkbox"/> Pinholes <input type="checkbox"/> Holidays		<input type="checkbox"/> Primer <input type="checkbox"/> Intermediate <input type="checkbox"/> Topcoat <input type="checkbox"/> Touch-Up			
<input type="checkbox"/> Abrasion <input type="checkbox"/> Fall Out <input type="checkbox"/> Other _____		Generic Type: _____ Qty Mixed: _____			
Surface Preparation		Mfr: _____ Mix Ratio: _____			
Start Time: _____ Finish Time: _____ Est Sq Ft: _____		Prod Name: _____ Mix Method: _____			
<input type="checkbox"/> Solvent Clean <input type="checkbox"/> Hand Tool <input type="checkbox"/> Power Tool		Prod #: _____ Strain/Screen: _____			
<input type="checkbox"/> HP Wash PSI _____ <input type="checkbox"/> Other _____		Color: _____ Material Temp: _____ °F			
<input type="checkbox"/> Abrasive Blast <input type="checkbox"/> Abrasive Type _____ <input type="checkbox"/> Sample		Kit Sz/Cond: _____ Sweat-In Time: _____ Min/Hrs			
<input type="checkbox"/> Blast Hose Size _____ <input type="checkbox"/> Nozzle Size/PSI _____		Shelf Life: _____ Pot Life: _____ Min/Hrs			
<input type="checkbox"/> Air Supply CFM _____ <input type="checkbox"/> Air Supply Cleanliness		Batch #s			
<input type="checkbox"/> Water/Oil Trap Check <input type="checkbox"/> Equipment Condition Check		(A) _____ Reducer #: _____			
Surface Cleanliness and Profile Measurement		(B) _____ Qty Added: _____ P/L/G/G			
<input type="checkbox"/> Job Specification <input type="checkbox"/> SSPC/NACE SP _____		(C) _____ % by Vol: _____ %			
<input type="checkbox"/> SSPC/NACE Spec/Visual Stds <input type="checkbox"/> _____		Reducer: _____ Specified WFT Avg: _____ MTS			
<input type="checkbox"/> Profile Check _____ <input type="checkbox"/> Disc <input type="checkbox"/> Tape <input type="checkbox"/> Gage		Achieved WFT Avg: _____ MTS			
<input type="checkbox"/> Specified _____ mils avg/Achieved _____ mils		<input type="checkbox"/> Airless/Conv Spray <input type="checkbox"/> Brush <input type="checkbox"/> Roller <input type="checkbox"/> Other _____			
<input type="checkbox"/> Surface Effect on DFT Gage/BMR _____ mils		Pump Pot: _____ Hose Diameter: _____ Air Check: _____			
Dry Film Thickness (DFT) Gage Calibration Record		Ratio/Size: _____ Hose Length: _____ SEP/Trap: _____			
Gage Type/Model _____ Gage Serial # _____ Plate/Shell Mils/µm _____ Gage Adj +/- _____ Spec Avg DFT _____ DFT Last Coat _____ DFT This Coat _____		GPM/CFM: _____ Spray Gun: _____ Filter: _____			
		PSI: _____ Tip Size: _____ Agitator: _____			
		Inspector Signature: _____ Date: _____			

Painting
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SECTION 25 00 05

COMMON WORK RESULTS FOR PROCESS MONITORING AND CONTROL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: The work specified in this Section consists of the supply of material, the installation, scope of work of the Process Monitoring and Control System herein designated as PMCS.
- B. Allen-Bradley PLC Systems, as called out on the drawings and in the specifications shall be provided, no exceptions. This is provided to meet the current system functionality, and to match the current manufacturer in the existing PLC panel.
- C. The existing PLC panel shall be replaced new, in-kind, to meet the operational requirements listed in Section 41 24 26 - Hydraulic Power Unit.
- D. All programming (the current program) of the current PLC/HMI system shall be provided by the OWNER for reference and information to the successful Contractor; the CONTRACTOR shall provide PLC programming for new HPU control panel and wiring as required to meet I/O requirements for the new panel. All HMI programming shall be provided by the OWNER; this CONTRACTOR shall coordinate all HMI/PLC I/O tags and re-linking tags with OWNER.
- E. PLC shall be a minimum of an Allen-Bradley CompactLogix L30 Series, no exceptions. Existing Control panel functions and operations shall be duplicated for each gate, except as indicated in Section 41 24 26 - Hydraulic Power Unit operations and/or as called out on the drawings.
- F. Related Sections:
 - 1. Section 01 33 00 – Submittal Procedures
 - 2. Section 25 00 60 – Process Control Panels and Hardware
 - 3. Section 35 22 26 – Slide Gates
 - 4. Section 41 24 26 – Hydraulic Power Unit

1.02 REFERENCES

- A. Abbreviations:
 - 1. ANSI - American National Standards Institute.
 - 2. FAT - Factory Acceptance Test.
 - 3. HMI - Human Machine Interface.
 - 4. IEEE - Institute of Electrical and Electronic Engineers.
 - 5. ISA - Instrument Society of American Standards.
 - 6. I&C - Instrumentation and Control.
 - 7. I/O - Input and Outputs.
 - 8. JIC - Joint Industrial Council.

9. NEC - National Electrical Code.
10. NEMA - National Electrical Manufacturers Association.
11. OSHA - Occupational Safety and Health Act.
12. O&M - Operation and Maintenance.
13. PC - Personal Computer.
14. PMCS – Process Monitoring and Control System.
15. P&ID - Process and Instrumentation Diagram.
16. PLC - Programmable Logic Controller.
17. UL - Underwriter's Laboratories, Inc.
18. CSA - Canadian Standards Association.
19. OIT – Operator Interface Terminal

B. Definitions

1. Enclosure: Control panel, console, cabinet, or instrument housing.
2. Work Day: 8 hours of actual work.
3. Rising/Falling: Terms used to define action of discrete devices about their set point.
 - a. Rising: Contacts close when an increasing process variable rises through set point.
 - b. Falling: Contacts close when a decreasing process variable falls through set point.
4. Signal Types:
 - a. Analog Signals, Current Type:
 - 1) 4 to 20 mA dc signals conforming to ISA S50.1.
 - 2) Unless otherwise indicated for specific PMCS Subsystem components, use the following ISA 50.1 options:
 - a) Transmitter Type: Number 2, two-wire.
 - b) Transmitter Load Resistance Capacity: Class L.
 - c) Fully isolated transmitters and receivers.
 - b. Analog Signals, Voltage Type: 1 to 5 volts dc within panels where a common high precision dropping resistor is used. Note the preference is direct 4-20mA where possible on analog inputs.
 - c. Discrete signals, two-state logic signals using 24Vdc sources as indicated. Note only provide 120VAC to match any current load devices; otherwise all discrete inputs shall be 24VDC. If outputs are required to be 120VAC then drive using interposing relays (coil at 24VDC, output contacts rated for 120VAC, 10 amps).

C. Reference Standards

1. Instrument Society of America (ISA):
 - a. S5.1, Instrumentation Symbols and Identification (NRC ADOPTED).
 - b. S50.1, Compatibility of Analog Signals for Electronic Industrial Process Instruments.
 - c. RP55.1, Hardware Testing of Digital Process Computers, Recommended Practice.
 - d. S5.3 Graphic Symbols for Distribution Control/Shared Display Instrumentation, Logic and Computer Systems.

- e. RP7.3, Quality Standards for Instrument Air.
- 2. National Electrical Manufacturers Association (NEMA):
 - a. NEMA 250-85, Enclosures for Electrical Equipment (1,000 Volts Maximum).
- 3. Underwriters Laboratory Inc. (UL):
 - a. UL 508, Standards for Safety, Industrial Control Equipment.
- 4. Deutsche Industrie-Norm (DIN):
 - a. VDE 0611, Specification for modular terminal blocks for connection of copper conductors up to 1,000V ac and up to 1,200V dc.

1.03 SCOPE OF WORK

A. General

- a. Equipment Shop Drawing Submittal Schedule
- b. Wiring Diagram Submittal Schedule
- 2. Field cables and raceways shall be supplied and installed as called out on the drawings. Control panels supplied by the PMCS provider shall be installed by the Provider. The CONTRACTOR shall provide coordination support for the installation of control panels, cables and raceways for the PMCS system.

B. Requirements

- 1. Provide the following equipment and services required under this Section and related sections:
 - a. Required Submittals.
 - b. Equipment as indicated on the Project Drawings.
 - c. Instructions, details, and recommendations to, and coordination with, CONTRACTOR for Certificate of Installation.
 - d. Verify readiness for operation.
 - e. Verify the correctness of final power and signal connections (lugging and connecting).
 - f. Adjusting and calibrating.
 - g. Starting up.
 - h. Testing and coordination of testing.
 - i. Training.

C. Interconnections Coordination

- 1. The PMCS provider shall verify the following work has been provided :
 - a. Correct type, size, and number of signal wires within their respective raceways.
 - b. Correct electrical power circuits and raceways.
 - c. Correct type, size, and number of fiber optic cables/strands and their raceways.
 - d. Correct size, type, and number of related pipes, valves, fittings, and tubes.
 - e. Correct size, type, materials, and connections of process mechanical piping for in-line primary elements.

D. Equipment Coordination

1. For equipment not provided under this section, but directly connected to equipment required by PMCS:
 - a. Obtain from provider, manufacturers' information on installation, interface, function, and adjustment.
 - b. Coordinate with provider to allow required interface and operation with PMCS.
 - c. For operation and control, verify that installations, interfacing signal terminations, and adjustments have been completed in accordance with manufacturer's recommendations.
 - d. Test to demonstrate required interface and operation with PMCS.
 - e. Examples of items in this category, but not limited to the following:
 - 1) Valve operators, position switches, and controls.
 - a) Demonstrate remote control of the valve operators and remote valve position control and monitoring from the existing operator workstation at the De Cordova maintenance building, and from the remote hand station, in coordination with the OWNER and ENGINEER.

1.04 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Provisions and all Supplementary General Provisions.
- B. Submit shop drawings for the system which are documented in accordance with Instrument Society of America (ISA) Standard ISA-S5.1/.2/.3/.4.
 1. Product Data: For each electrical component, include manufacturers descriptive literature; product specifications; published details; technical bulletins; performance and capacity rating curves, charts, and schedules; catalogue data sheets; and other submittal materials as required to verify that the proposed products conform to the quality and function ability of the specified products.
 2. Identification: Clearly indicate by an arrow and/or a box (on submissions covering more than one product type or style) exactly which product is being submitted for approval.
 3. Equipment Characteristics: Size, location, weight, and electrical requirements.
 4. Manufacturer: Include the catalogue name, company name, address, and telephone number for each product submitted.
- C. Submit copies of the Equipment O&M manuals for equipment supplied within four (4) weeks prior to start up and final acceptance test. The submission and approval of this manual is considered to be an integral part of furnishing and delivery of the system equipment. Include the following elements in each manual in addition to all submittal items listed above.
 1. Erection and installation sequence and instructions.
 2. Exploded view drawings and illustrations with sequence description for assembly and disassembly of equipment.

3. Comprehensive parts and materials list for each equipment element indicating manufacturer and manufacturer's identification number. Include name, address, and telephone number of sales and service office nearest to the final destination of the PMCS, for each major equipment item.
4. Schedules of recommended spare parts to be stocked, including part number, inventory quantity, and ordering information.
5. Performance rating and nameplate data for each major system component.
6. Procedures for starting, operating, adjusting, calibrating, testing, and shutting-down system equipment.
7. Emergency operating instructions and trouble-shooting guide.
8. Schedule of routine maintenance requirements and procedures, and preventative maintenance instructions required to insure satisfactory performance and equipment longevity.
9. Maintenance instructions for extended out-of-service periods.
10. Complete listing of all software programming.
11. Complete Operator's Supervisors Manual for the Control System which includes system hardware and software, and a "how to" description of the system.
12. Testing Reports.
13. "As-built" drawings of control panels, wiring, instruments, etc. Final as-built drawing shall be provided on compact disks in AutoCAD format.
14. PLC Control Panels: Provide the following information for each individual supplied control panel.
 - a. System Architecture Diagram (if applicable)
 - b. Enclosure and Panel Layout Drawing(s)
 - c. Equipment Build Sheet (Bill of Materials)
 - d. Equipment manufacturers' product information
 - e. Power Distribution Ladder Drawing(s)
 - f. I/O Module Wiring Diagrams (Loop Drawings)

D. See also Specification Section 01 78 00 – Closeout Submittals.

1.05 QUALITY ASSURANCE

- A. The drawings and specifications are based on instrumentation and control equipment manufactured by the first named manufacturer. Any changes to the structure, piping, electrical work, etc., required for other approved manufactures shall be borne by the CONTRACTOR. The CONTRACTOR shall submit drawings to the ENGINEER, showing changes in the equipment, piping, structure and electrical work.
- B. Provide products that are listed and labeled by Underwriters Laboratory, approved by Factory Mutual, or certified as meeting the standards of UL by the Electrical Testing Laboratory unless products meeting the requirements of these testing laboratories are not readily available or unless standards do not exist for the products. Provide products that are listed and labeled or approved as stated above for the location installed in and listed and labeled or approved as indicated and specified for the applications the items are intended for.

- C. All components (i.e. hardware, software, etc.) of the PMCS shall be the most current proven design available at the time of installation of the system. The CONTRACTOR shall provide a warranty for all PMCS components for a period of two years in accordance with the General/Supplementary Conditions after start up and OWNER acceptance. In addition, the CONTRACTOR shall provide software upgrades for a period of one year after plant start up and OWNER acceptance at no additional cost to the PROJECT. All components shall be suitable for the intended application and shall be installed and wired in strict accordance with the manufacturer's requirements.

The PMCS equipment shall be the standard products of a manufacturer who has been regularly engaged in the successful production of high quality equipment and systems of the type specified for at least 10 years, has supplied such equipment for at least five years of the ten year period, and has at least three similar system installations in successful operation for at least five years.

- D. The CONTRACTOR shall assume complete system responsibility for the adequate and proper operation of all equipment furnished regardless of original source or manufacturer.

1.06 DELIVERY STORAGE AND HANDLING

- A. Store all PMCS equipment and accessories specified in this Section. Verify from the Manufacturer the maximum and minimum temperature and maximum relative humidity for storing the equipment and conform to the Manufacturer's requirements. The minimum storage temperature shall not be less than 50 degrees F if not specified by the manufacturer. Protect the equipment from humid conditions which might cause corrosion of the electrical and electronic parts of the equipment. Failure to store equipment in the specified or approved manner shall be sufficient reason for not accepting the equipment, regardless of the outside appearance or warranty of the manufacturer. Protect all electronic equipment from a dusty environment by sealing the equipment in plastic, etc.

1.07 PROJECT/SITE CONDITIONS

- A. Environmental Design Requirements: The following defines certain types of environments. PMCS Subsystems refer to these definitions by name to specify the environments requirements for individual equipment units.
1. Inside:
 - a. Temperature: 20 to 104 degrees F.
 - b. Relative Humidity: 10 to 95 percent non-condensing.
 - c. NEC Classification: Non-hazardous.
 2. Outside:
 - a. Temperature: Minus 20 to minimum of 122 degrees F.
 - b. Relative Humidity: 10 to 100 percent rain, snow, freezing rain.
 - c. NEC Classification: Non-hazardous.

1.08 WARRANTY

- A. The CONTRACTOR shall provide a warranty for all PMCS equipment for a period of two (2) years in accordance with the General/Supplementary Conditions after start-up and ENGINEER acceptance.

1.09 SYSTEM CONTROL CONCEPT

- A. The purpose of the System Control Concept is to provide a written description of how the process equipment should be monitored and controlled by the PMCS.
- B. The Operation of the Control System is written in the Section 41 24 26 – Hydraulic Power Unit.
- C. All PLC programming shall be provided by the CONTRACTOR, in coordination with the OWNER. All updates to the current WW 2014 HMI shall be provided by the OWNER; CONTRACTOR shall provide coordination of the effort with the OWNER.

PART 2 PRODUCTS**2.01 GENERAL**

- A. The CONTRACTOR shall check and verify that all manufacturers' part numbers indicated on the drawings and specifications are current for the specified application.

2.02 SPARE PARTS

- A. Provide spare parts as specified in this section and the related sections.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Install equipment as shown on the Drawings and approved shop drawings and as directed by the manufacturer's representative.
1. Mount enclosures on 1/4-inch (6mm) minimum spacers or U-channel supports to provide a space between enclosures and mounting surfaces.
 2. Set the top of enclosures 6' above the finished floor or grade unless otherwise indicated or specified.

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments
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SECTION 25 00 40
PROGRAMMABLE LOGIC CONTROLLERS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: The requirements for Programmable Logic Controllers herein designated as PLC.
- B. Existing PLC Control Program shall be provided to the successful bidder.
- C. Provide a software driver to communicate with the current US Filter HMI (Wonderware INTOUCH 2014) in the maintenance building. CONTRACTOR shall include a hardware or software driver and configuration in his bid price and shall confirm the current HMI prior to bidding.
- D. Allen Bradley Ethernet IP shall be the communications protocol; provide any gateways as required for communications to the current HMI.
- E. Reprogram and match current HMI tags with PLC registers as required for the Slide Gates Screen and any Alarm Screens or Trending Screens or overview screens. Coordinate with the OWNER.
- F. HMI workstation (ETR) is located in the Maintenance Building.
- G. Related Sections
 - 1. Section 01 33 00 – Submittal Procedures
 - 2. Section 01 78 00 – Closeout Submittals
 - 3. Section 25 00 05 – PMCS Common Work Results

1.02 REFERENCES

- A. Reference Standards:
 - 1. National Electrical Manufacturers Association (NEMA):
 - a. NEMA 250-85, Enclosures for Electrical Equipment (1,000 Volts Maximum).
 - 2. Underwriters Laboratory Inc. (UL):
 - a. UL 508, Standards for Safety, Industrial Control Equipment.
 - 3. Deutsche Industrie-Norm (DIN)
 - a. DIN VDE 0611, Specification for modular terminal blocks for connection of copper conductors up to 1,000V ac and up to 1,200V dc.
 - 4. National Fire Code, National Fire Protection Association (NFPA):
 - a. 70, National Electric Code.

1.03 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00, Submittal Procedures, the requirements of the General Provisions and all Supplementary General Provisions.
- B. Submit shop drawings for all components as follows:
 - 1. Product Data: For each product, include manufacturers descriptive literature; product specifications; published details; technical bulletins; performance and capacity rating curves, charts, and schedules; catalogue data sheets; and other submittal materials as required to verify that the proposed products conform to the quality and function ability of the specified products.
 - 2. Identification: Clearly indicate by an arrow and/or a box (on submissions covering more than one product type or style) exactly which product is being submitted for approval.
 - 3. Equipment Characteristics: Size, location, weight, and electrical requirements.
 - 4. Manufacturer: Include the catalogue name, company name, address, and telephone number for each product submitted.
- C. Submit hardware user manual and programming user manual.
- D. Provide power supplies and processor sizing calculations.
- E. See also Specification Section 01 78 00 – Closeout Submittals.

1.04 QUALITY ASSURANCE

- A. The drawings and specifications are based on the device manufactured by the first named manufacturer. Any changes to the structure, piping, electrical work, etc., required for other approved manufactures shall be borne by the CONTRACTOR in accordance with the Contract Document substitution provisions. The CONTRACTOR shall submit drawings to the ENGINEER for approval, showing changes in the equipment, piping, structure and electrical work

1.05 DELIVERY STORAGE AND HANDLING

- A. Store all devices and accessories specified in this Section, which are delivered to the project site prior to the time the CONTRACTOR is ready to install them. Verify from the manufacturers the maximum and minimum temperature and maximum relative humidity for storing the equipment and conform to the manufacturer's requirements. The minimum storage temperature shall not be less than 50 degrees F. Protect the equipment from humid conditions which might cause corrosion of the electrical and electronic parts of the equipment. Failure to store equipment in the specified or approved manner shall be sufficient reason for not accepting the equipment, regardless of the outside appearance or warranty of the manufacturer. Protect all electronic equipment from a dusty environment by sealing the equipment in plastic, etc.

1.06 PROJECT/SITE CONDITIONS

- A. Environmental Design Requirements: The following defines certain types of environments. Refer to these definitions by name to specify the environments requirements for individual devices.
1. Inside, Air Conditioned:
 - a. Temperature:
 - 1) Normal: 60 to 80 degrees F.
 - 2) With Up to 4-Hour HVAC System Interruptions: 40 to 105 degrees F.
 - b. Relative Humidity:
 - 1) Normal: 10 percent (winter) to 70 percent (summer).
 - 2) With Up to 4-Hour HVAC System Interruption: 10 to 100 percent.
 - c. NEC Classification: Non-hazardous.
 2. Inside:
 - a. Temperature: 20 to 104 degrees F.
 - b. Relative Humidity: 10 to 95 percent non-condensing.
 - c. NEC Classification: Non-hazardous.
 3. Inside, Corrosive:
 - a. Temperature: Minus 20 to 104 degrees F.
 - b. Relative Humidity: 10 to 95 percent non-condensing.
 - c. Corrosive Environment: Chlorine gas/sodium hypochlorite.
 - d. NEC Classification: Non-hazardous.
 4. Inside, Hazardous:
 - a. Temperature: Minus 20 to 104 degrees F.
 - b. Relative Humidity: 10 to 95 percent non-condensing.
 - c. NEC Classification: Class 1, Division 1, Group D.
 5. Outside:
 - a. Temperature: Minus 20 to 104 degrees F.
 - b. Relative Humidity: 10 to 100 percent rain, snow, freezing rain.
 - c. NEC Classification: Non-hazardous.
 6. Outside, Corrosive:
 - a. Temperature: Minus 20 to 104 degrees F.
 - b. Relative Humidity: 0 to 100 percent, rain, snow, freezing rain.
 - c. Corrosive Environment: Chlorine gas.
 - d. NEC Classification: Non-hazardous.
 7. Outside, Hazardous:
 - a. Temperature: Minus 20 to 104 degrees F.
 - b. Relative Humidity: 0 to 100 percent rain, snow, freezing rain.
 - c. NEC Classification: Class 1, Division 1, Group D.

1.07 WARRANTY

- A. The CONTRACTOR shall provide a warranty for all devices for a period of two (2) years in accordance with the General/Supplementary Conditions beginning from the date of Final Completion.

PART 2 PRODUCTS

2.01 GENERAL

- A. PLC Inputs/Outputs shall match the current panel; the CONTRACTOR shall confirm in the field prior to bidding. Confirm the following modules:
 - 1. 4 channel analog input-qty.-3-1769-IF4I
 - 2. 16-point digital AC input-QTY as required-1769IA16
 - 3. 16 point digital DC input-qty-4-1769-IQ16
 - 4. 16-point digital output-qty.-3-1769-OW16
 - 5. 8 channel analog current output-qty.-1-1769-OF8C
 - 6. End cap-qty.1-1769-ECR
- B. Provide the PLC components as indicated on the drawings and according to this Section. Adjust modules and types and quantities as required.
- C. The PLC shall be an intelligent process controller that can perform both data acquisition and process control functions. It shall have the ability to function independently; that is, perform its function without the need for commands from a separate computer.
- D. The PLC shall utilize a backplane design that can be mounted in an enclosure. Modules shall be inserted on the backplane, one module per space, and shall communicate with the PLC processor over the backplane. Power shall also be delivered to the modules over the backplane. Module addressing shall be done via the controller software not hardware addressing.
- E. The PLC shall be able to communicate with a computer or other PLC's via fiber optic cable or copper cable.
- F. The PLC shall have the capability of supporting networking strategies by adding additional cards for inter-PLC communications.

2.02 PROCESSORS

- A. The processor shall be a single module design that contains the operating system memory, application memory, communication ports, and status indicators and switches to support special functions.
- B. The processor memory shall be sized large enough to contain the required programming logic plus 100% spare capacity for future programming requirements. The processor memory shall be capable of being increased without any modification to the user program.
- C. The processor shall use battery backed static RAM to hold application programs. The battery shall be serviceable without taking the processor module out of service. The

battery voltage shall be monitored for a low voltage condition. A low voltage status bit shall be available for use by the PLC program.

- D. The processor shall contain illuminated indicators readable from the front of the processor module for diagnostics. Diagnostic status bits shall be available for use by the PLC program.
- E. The processor instruction set shall include but not limited to the following:
 - 1. Normally open Positive Transition, Negative Transition
 - 2. Normally closed
 - 3. Latching coil
 - 4. Timers
 - 5. Up/Down counters
 - 6. Bit modify
 - 7. Add
 - 8. Subtract
 - 9. Divide
 - 10. Multiply
 - 11. Square Root
 - 12. Log
 - 13. Natural Log
 - 14. Exponential
 - 15. Block read/Block write
 - 16. And
 - 17. Or
 - 18. Xor
 - 19. Complement
 - 20. Compare
 - 21. Jump to
 - 22. Label
 - 23. Return
 - 24. Status
 - 25. Event Alarm Recording
 - 26. Remote I/O Health
 - 27. Analog in
 - 28. Analog out
 - 29. Digital IN
 - 30. Digital OUT
 - 31. Alarm
 - 32. Average
 - 33. Calculate
 - 34. Equation
 - 35. Delay
 - 36. Function generator
 - 37. Integrate
 - 38. Limit

- 39. Lead/Lag
- 40. On/Off Control
- 41. PID
- 42. Ramp
- 43. Totalizer
- 44. Complex PID
- 45. PI
- 46. Ratio Control
- 47. Custom C Loadable

2.03 POWER SUPPLIES

- A. The power supply shall provide power to the backplane as well as protect the system from noise and swings in the nominal input voltage. Power supplies shall be inserted on the backplane. The power supply shall feature over current and over voltage protection. It shall be capable of operation in noisy locations without the need for isolation transformers. The power supply shall not be used for power to interface between field devices and I/O modules.

2.04 INPUT/OUTPUT (I/O) MODULES

- A. The PLC processor shall receive data from the process I/O modules located on the backplane of the Local O racks. The modules shall be designed to meet international IEC electrical standards as well as be UL approved. All modules shall be mechanically keyed between the I/O module and the terminal strip to ensure the wiring and modules are correctly matched. Extensive diagnostic indicators shall be available on each module including information on the state of the I/O, along with specific module by module special features such as field wiring faults, blown fuses, and over/under voltage range information.
- B. The discrete input module shall be capable of handling a minimum of 16 discrete inputs.
 - 1. The following input ranges shall be available:
 - a. 115VAC Grouped
 - b. 115VAC Isolated
 - c. 24VDC Grouped-24VDC is preferred and shall be utilized
 - d. 24 VAC Isolated
- C. The discrete output modules shall be capable of handling a minimum of 16 discrete outputs.
 - 1. The following output module ranges shall be available:
 - a. 24 VAC - 2 amps per point isolated
 - b. 115 VAC - 2 amps per point group fused
 - c. 24 VDC - 0.5 amps per point, group fused-24VDC is preferred and shall be utilized
 - d. Relay Output - 2 amps per point

- D. The analog input modules shall be capable of handling a minimum of 4 analog inputs.
 - 1. The following input module ranges shall be available:
 - a. 4 to 20 mA-preferred unless sensor input source is only 1-5 VDC
 - b. 1 to 5 VDC
 - c. RTD – 100ohm
 - d. Thermocouples
 - 2. The following physical characteristics shall be available:
 - a. Impedance – Greater than 20 megohm (voltage); minus 250 ohm (current)
 - b. Resolution – 16 bit minimum
 - c. Accuracy at 25 degree C. – plus or minus 0.05 percent of full scale typical; plus or minus 0.1 percent Maximum
 - d. Linearity – Plus or minus 0.4 percent
 - e. Isolation – Channel to Channel 30 VDC
 - f. Isolation – Channel to Bus 100 VAC RMS for 1 min.
 - g. Fault Detection – Broken wire in 4 to 20 mA mode
 - h. Under Voltage – in volt mode
 - i. Update Time = 5ms (all channels).
- E. The analog output module shall be capable of handling a minimum of 4 analog outputs.
 - 1. The output range shall be 4 to 20 mA
 - 2. The following physical characteristics shall be available:
 - a. Maximum loop supply voltage shall be 60 VDC
 - b. Resolution – 16 bit minimum
 - c. Accuracy at 25 degree C, plus or minus 0.20 percent of full scale
 - d. Linearity – Plus or minus 1 lsb
 - e. Isolation – Channel to Channel 500 VAC at 47 to 63 Hz. or 750VDC for 1 min.
 - f. Isolation – Channel to Bus 1780 VAC at 47 to 63 Hz. or 2500 VDC for 1 min.
 - g. Fault Detection – Broken wire
 - h. Update Time – 3ms (all channels).
 - i. External power supply for all loop power
 - 3. Provide individual fuses for all analog outputs.

2.05 INPUT/OUTPUT (I/O) CAPACITY

- A. The I/O capacity of each PLC shall be sized large enough to meet the I/O requirements based on the Bid design documents.
- B. An additional minimum of 20% spare capacity of each type of I/O shall be provided for future requirements in each PLC. The number of spare I/O shall be based on 20% of the total number of each type of I/O used in the PLC.
 - 1. On top of the 20% spare; provide one additional digital input module, 8 inputs, in each PLC panel (future use).

- C. All spare I/O points shall be wired out to field termination blocks in the same manner as used I/O.

2.06 COMMUNICATIONS

- A. The processor and other communication modules shall be capable of communicating utilizing AB Ethernet IP, standard Ethernet TCP/IP protocols and (if required) Serial RS-232, RS-485 protocols.

2.07 PROGRAMMING SOFTWARE

- A. The programming environment (programming tools) for creating the application software must be compatible with standard computers and run under the latest version of Microsoft Windows. The application software shall be downloaded to the target PLC RAM memory. It shall be possible to download the application software to any PLC on the network from any computer attached to any other PLC on the network.
- B. The programming tools shall be of the PLC manufacturer's own design. Third party programming and documentation packages shall not be acceptable. The CONTRACTOR shall provide one programming and one documentation software package; including original disks, program disks, and communication cables needed to program the PLC.
- C. The programming tools shall provide a complete configuration environment for creation, modification, documentation, and downloading of control program to the PLC. The programming software shall use a menu driven method of data entry.
- D. Once a control program has been written and downloaded to the PLC, the programming software shall provide on-line and offline access to the running program. It shall allow for online or off-line inspection and modification of the control program. In addition, it shall provide the capability of the following:
 - 1. Access to signal data by signal name, signal type, alarm status, and list.
 - 2. Provide communication port statistics.
- E. It shall also be possible to upload the control program, online from the PLC to the computer.
- F. A utility shall be provided to fully document the control program including memory map and signal cross-reference listing. This utility shall produce a disk file that may output to a printer for a hard copy listing.

2.08 SPECIAL PROVISIONS

- A. The PLC cables and connectors required for operation and programming shall be provided by the CONTRACTOR.
- B. The minimum software requirements:
 - 1. Latest version of selected PLC manufacturer's programming software.

2. All manuals, disks, runtime keys, and other peripherals with serial numbers intact are to be turned over to the OWNER upon satisfactory completion of the project.

2.09 SPARE PARTS

A. Provide:

1. One spare processor module
2. One spare communications module of each type
3. One spare power supply of each type
4. One spare backup CPU battery
5. One spare I/O module of each type

2.10 MANUFACTURERS

A. Allen-Bradley-CompactLogix

1. Processor: 1769-L33ER, 2 GB SD card-Minimum
 - 1) The modules shall be designed to meet international IEC electrical standards as well as be UL approved
 - 2) Diagnostic indicators shall be available on each module including information on the state of the I/O, along with specific module by module special features such as field wiring faults, blown fuses, and over/under voltage range information
 - 3) Communicates by using Ethernet/IP protocol
 - 4) Certifications: CE, c-UL, C-Tick
 - 5) Provide load calculations for RIO rack power supply.
2. I/O Adapter and Communications Interface Module
 - 1) Model Number: 1769-AENTR
 - 2) Network Type: Ethernet I/P
3. The following below are only suggested; CONTRACTOR can choose to match current PLC or provide I/O as necessary for new panel and existing inputs and outputs. Note all discrete inputs and outputs preferred as 24VDC; any 120VAC loads driven from interposing relays with 10-amp rated contacts; all analog preferred as 4-20mA.
4. Digital Inputs:
 - 1) Model Number: 1769-IQ16
 - 2) Number of Inputs: 16 (8 points per group)
 - 3) 24 Volts DC Sink/Source
 - 4) Voltage, on state input, nom: 10VDC
5. Digital Outputs:
 - 1) Model Number: 1769-OW8
 - 2) Number of Outputs: 8 (NO, 4 points per group)
 - 3) Current per point, max: 2.5 amps
 - 4) Operating voltage: 5-265VAC; 5-125VDC
6. Analog Inputs:
 - 1) Model Number: 1769-IF4I
 - 2) Number of Inputs: 4

- 3) Input signal range: 4 – 20 mA, Isolated
- 4) Rated working Voltage: 30VDC
- 7. Analog Outputs:
 - 1) Model Number: 1769-OF8C
 - 2) Number of Outputs: 8
 - 3) Output signal range: 4 – 20 mA
 - 4) Rated working Voltage: 30VDC
- 8. End Caps
 - a. Provide right end cap, # 1769-ECR
 - b. Current Draw: [5mA@5.1V](#) DC; 0mA@24VDC
- 9. Spare parts
 - a. Provide:
 - 1) One Communications interface module of each type provided
 - 2) One spare I/O modules of each type provided
 - 3) One spare end cap (1769-ECR)
- 10. Manufacturers
 - a. Allen-Bradley
 - 1) 1769 CompactLogix I/O modules

PART 3 EXECUTION

3.01 INSTALLATION

- A. The CONTRACTOR shall load software, into hardware supplied under separate Section, required for an operational control system, including databases (for points specified and shown), operational parameters, and system, command, and application programs. The CONTRACTOR shall adjust, tune, debug, and commission all software and parameters for controlled systems to assure proper operation in accordance with the sequences of operation and database tables.

3.02 FIELD QUALITY CONTROL

- A. Inspection. Upon completion of this portion of the work, the CONTRACTOR shall provide for the services of a qualified representative of the manufacturer to inspect and approve the installation.
- B. Tests. Upon completion of all inspections and prior to acceptance by the ENGINEER, perform the field tests. Note ENGINEER acceptance of the panel is after successful substantial and final completion and after all process and mechanical performance tests have been performed.

3.03 DEMONSTRATION

- A. When all required tests have been performed and prior to final approval, the CONTRACTOR shall thoroughly demonstrate to the ENGINEER the operation of all items installed under this section and related sections.

END OF SECTION

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SECTION 25 00 60
PROCESS CONTROL PANELS AND HARDWARE

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: General requirements for Control Panels.
 - 1. Provide a new control panel that matches the current control panel, including size and quantity of I/O and PLC Processor.
 - 2. New panel shall have 20 percent spare I/O.
 - 3. New panel shall be NEMA 4X stainless steel, minimum size 48" H x 36" W x 12" D.
 - 4. New Panel shall be UL 508A listed and labeled.
 - 5. Existing panel layout drawings are included in the contract drawings as for general Reference Only and for bidding purposes Only; however, the new panel shall provide a convenience 120VAC receptacle to be placed at the bottom right corner along with panel ground bars.
 - 6. Mount heater in the bottom right-hand corner and according to UL requirements; Panduit sizes shall be increased to 3" x 3" or 2" x 4" from the existing drawings. Ground bar shall be provided in the bottom of the new panel.
- B. Related Sections:
 - 1. Section 01 33 00 – Submittal Procedures
 - 2. Section 25 00 05 – Common Work Results for Process Monitoring and Control Systems
 - 3. Section 41 24 26 – Hydraulic Power Unit

1.02 REFERENCES

- A. Definitions:
 - 1. Controller - The logic processor that monitors and controls the input/output signals of a PLC.
 - 2. I/O - Input and Output modules and signals of a PLC.
 - 3. Interposing Control Relay – An electrically actuated relay whose coil is energized in order to provide a dry (un-powered) isolated digital control signal (on/off) to another electrically actuated device.
 - 4. Module - An individual electronic card in the PLC rack.
 - 5. PCP - Process Control Panel, the enclosure containing the PLC.
 - 6. PLC - Programmable Logic Controller; includes the controller and the I/O modules.
 - 7. Chassis - The housing which contains the controller and I/O modules of a PLC.
 - 8. Slot - The portion/section of a PLC chassis into which a controller or I/O module is inserted.

B. Reference Standards:

1. Institute of Electrical and Electronic Engineers/American National Standards Institute (IEEE/ANSI)
2. Instrumentation Society of America (ISA)
3. National Electrical Code (NEC)
4. International Electrotechnical Commission (IEC)
5. National Electrical Manufacturers Association (NEMA)
6. Computer and Business Equipment Manufacturers Association (CBEMA)
7. Underwriters Laboratory, Inc. (UL)

1.03 SUBMITTALS

A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Provisions and all Supplementary General Provisions.

B. Submit shop drawings for all components as follows:

1. Product Data: For each component, include manufacturers descriptive literature; product specifications; published details; technical bulletins; performance and capacity rating curves, charts, and schedules; catalogue data sheets; and other submittal materials as required to verify that the proposed products conform to the quality and function ability of the specified products.
2. Identification: Clearly indicate by an arrow on submissions covering more than one product type or style exactly which product is being submitted.
3. Equipment Characteristics: Size, location, weight, and electrical requirements.
4. Manufacturer: Include the catalogue name, company name, address, and telephone number for each product submitted.

C. Arrangement Drawings:

1. Provide Arrangement Drawing for external front panel, and internal side and rear mounting sub-panels.
2. Provide Bill of Materials, on Arrangement Drawing, identifying equipment shown and all software specified in this section. Equipment shall be referenced by a numerical item number. Material schedule shall include the following information:
 - a. Item
 - b. Identity
 - c. Quantity
 - d. Description
 - e. Manufacturer
 - f. Catalog Number
 - g. Remarks
3. Provide nameplate schedule, on the Arrangement Drawings, and include the following information:
 - a. Item
 - b. Quantity
 - c. Line 1 Text
 - d. Line 2 Text

- e. Line 3 Text
- f. Text Height
- g. Nameplate Size
- 4. Provide Legend schedule, on the Arrangement Drawings, and include the following information:
 - a. Item
 - b. Quantity
 - c. Line Text

D. Ladder Diagrams:

1. Provide power distribution diagrams, relay control wiring diagrams, and PLC I/O wiring diagrams drawn with circuitry arranged in functional sequence on ladder-type diagrams. Assign each horizontal line or “rung” on the ladder diagram a sequential number and write that number to the left the ladder.
2. For Power distribution and relay control wiring diagrams, use the rung number to develop the wire numbers. Form the first wire number on any rung by adding a “1” to the end of the rung number. When a wire passes through any device capable of breaking the circuit (i.e. circuit breaker, fuse, switch, relay contact), number the wire on the opposite side of that device with the next wire number in the sequence. Form the second wire number on any rung by adding a “2” to the end of the rung number. Continue the wire numbering in this manner from left to right along the circuit on that particular rung. Generated rung numbering on all wiring diagrams using the following sequence:
 - a. Use rung numbers 000 to 099 for power distribution drawings.
 - b. Use rung numbers 100 to 199 on the drawing for the module in Slot 1.
 - c. Use rung numbers 200 to 299 on the drawing for the module in Slot 2.
 - d. Use rung numbers 300 to 399 on the drawing for the module in Slot 3.
 - e. Use rung numbers 400 to 499 on the drawing for the module in Slot 4.
 - f. Use rung numbers 500 to 599 on the drawing for the module in Slot 5.
 - g. Use rung numbers 600 to 699 on the drawing for the module in Slot 6.
 - h. Use rung numbers 700 to 799 on the drawing for the module in Slot 7.
 - i. Use rung numbers 800 to 899 on the drawing for the module in Slot 8.
 - j. Use rung numbers 900 to 999 on the drawing for the module in Slot 9.
 - k. Use rung numbers 1000 to 1099 on the drawing for the module in Slot 10.
 - l. Continue rung numbering on each drawing for subsequent slots in the same manner as indicated above.
3. Draw relay coils on the right side of the ladder. Show the rung numbers on which the relay contacts appear to the right of each coil. Designate a normally closed contact by drawing a diagonal line through the contact. Designate a timed contact by adding the letters "TR" to the right and below the contact.
 - a. Number relay coils on power distribution and digital control wiring drawings shall be numbered sequentially from R-01 to R-99.
 - b. Number relay coils on PLC digital output module I/O wiring drawings by an “R” followed by the slot number followed by a dash followed by the two digit point number.
 - 1) Examples are “R1-02” or “R2-15”, where:
 - a) “R1” or “R2” designate the digital output module slot number and

- b) “02” or “15” designate the digital output module point number.
- 4. Show field and control panel terminal blocks on the drawing with the terminal numbers of devices.
- 5. Show all standard symbols used on the drawings on a symbols sheet.
- 6. Show field wiring as a dashed line with cable number identified.
- 7. Draw PLC input modules on the right side of the ladder and PLC output modules on the left side of the ladder.
- 8. Draw the AC power line voltage (120VAC) wire on the left side of the ladder and the AC power neutral (120VAC) wire on the right side of the ladder.
- 9. Draw the DC power positive (24VDC+) wire on the left side of the ladder and the DC power negative (24VDC-) wire on the right side of the ladder.

E. Loop Diagrams

- 1. Draw analog signals as loops that conform to ISA S5.4 and project drawings.
- 2. Field and control panel terminal blocks shall be shown on the power distribution and I/O module wiring drawings along with the terminal numbers on all associated devices.
- 3. Show all field wiring as dashed lines with cable numbers properly identified using a leader from the dashed lines to the cable number identifier.
- 4. Coordinate all Analog and Digital Signal Cable numbers with the field instrument to which they terminate. Format the cable number to include the PCP number (or designator) followed by a dash and the instrument designation followed by a dash and the instrument number.
 - a. Examples are “009-LIT-611” or “BPS-LSH-902”, where:
 - 1) “009” or “BPS” designate the PCP number or name,
 - 2) “LIT” or “LSH” designate the instrument type and
 - 3) “611” or “902” designate the instrument number.
- 5. Coordinate all signal conductors in Analog Signal Cables with the Slot and Point numbers to which they terminate in the PCP cabinet. Format the conductor number to include the I/O type designator followed by a colon, followed by the slot number, followed by a forward slash (/) followed by the point number followed by the polarity designation contained in parenthesis.
 - a. Examples are “O:1/2(+)” or “I:2/15(-)”, where:
 - 1) “O” or “I” designate the I/O type,
 - 2) “1” or “2” designate the I/O module slot number,
 - 3) “2” or “15” designate the I/O point number and
 - 4) “(+)” or “(-)” designate the polarity of the signal wire.
- 6. Coordinate the power conductor (hot wire) in a Digital Input Signal Cable the rung number from which the power conductor originates.
- 7. Coordinate the signal conductor (signal wire) in a Digital Input Signal Cable with the Slot and Point numbers to which it terminates in the PCP cabinet. Format the conductor number to include the I/O type designator followed by a colon, followed by the slot number, followed by a forward slash (/) followed by the point number.
 - a. Examples are “I:1/2” or “I:2/15”, where:
 - 1) “I” designate the I/O type,
 - 2) “1” or “2” designate the I/O module slot number and

- 3) "2" or "15" designate the I/O point number.
8. Coordinate the signal conductor (signal wire) from a Digital Output point to the coil of the associated interposing control relay with the Slot and Point numbers from which it originates in the PCP cabinet. Format the conductor number to include the I/O type designator followed by a colon, followed by the slot number, followed by a forward slash (/) followed by the point number.
 - a. Examples are "O:1/2" or "O:2/15", where:
 - 1) "O" designate the I/O type,
 - 2) "1" or "2" designate the I/O module slot number and
 - 3) "2" or "15" designate the I/O point number.
9. Coordinate the two isolated control conductors from a Digital Output interposing control relay with the rung number from which they originate. The first wire number on that rung shall be formed by adding a "1" to the end of the rung number. The second wire number on that rung shall be formed by adding a "2" to the end of the rung number.

F. Test Documentation

1. Provide a complete set of test documentation to the ENGINEER after testing is completed and shipment of the control panel.

G. Operations and Maintenance Manual

1. Submit the following As Built documentation to be included in the O & M manual.
 - a. System Architecture Diagram (if applicable)
 - b. Enclosure and Panel Layout Drawing(s)
 - c. Equipment Build Sheet
 - d. Equipment manufacturers' product information
 - e. Power Distribution Ladder Drawing(s)
 - f. I/O Module Wiring Diagrams (Loop Drawings)

H. See also Specification Section 01 78 00, Closeout Submittals.

1.04 QUALITY ASSURANCE

- A. The drawings and specifications are based on the components manufactured by the first named manufacturer. Any changes to the required for other approved manufactures shall be borne by the CONTRACTOR in accordance with Contract Document substitution requirements. The CONTRACTOR shall submit drawings to the ENGINEER, showing changes in the equipment, piping, structure and electrical work.
- B. Manufacturer Qualifications
 1. The control panels shall be the standard products of a manufacturer who has been regularly engaged in the successful production of high quality control panels of the type specified for at least three (3) years.
- C. Examination of Equipment for Safety

1. Control Panels shall be UL-508A listed and labeled by the Supplier. The Control panel shall be built in compliance with NEC Article 409.
2. Equipment and materials installed within the control panel shall be U.L. Listed, Labeled or identified.
3. Equipment and materials shall have been tested by a testing laboratory; and shall meet, or exceed, nationally recognized standards, or have been found suitable for use in the specific manner as intended by the ENGINEER.
4. Equipment and materials utilized shall be included within published listings prepared by testing laboratories, inspection agencies or other organizations concerned with product evaluations.

1.05 DELIVERY STORAGE AND HANDLING

- A. Store all control panels and accessories specified in this Section. Verify from the Manufacturer the maximum and minimum temperature and maximum relative humidity for storing the equipment and conform to the Manufacturer's requirements. The minimum storage temperature shall not be less than 50 degrees F unless specified otherwise by the manufacturer. Protect the equipment from humid conditions which might cause corrosion of the electrical and electronic parts of the equipment. Failure to store equipment in the specified or approved manner shall be sufficient reason for not accepting the equipment, regardless of the outside appearance or warranty of the manufacturer. Protect all electronic equipment from a dusty environment by sealing the equipment in plastic, etc.
- B. The control panel shall be internally wired before delivery to the job site. Field modifications to existing equipment or internal wiring shall be the responsibility of the CONTRACTOR. Field work shall be performed under the prevailing labor conditions.

1.06 PROJECT/SITE CONDITIONS

- A. Environmental Design Requirements: The following defines certain types of environments. Refer to these definitions by name to specify the environments requirements for individual devices.
 1. Inside:
 - a. Temperature: 20 to 104 degrees F.
 - b. Relative Humidity: 10 to 95 percent non-condensing.
 - c. NEC Classification: Non-hazardous.
 2. Outside:
 - a. Temperature: Minus 20 to 104 degrees F.
 - b. Relative Humidity: 10 to 100 percent rain, snow, freezing rain.
 - c. NEC Classification: Non-hazardous.
 3. Outside, Corrosive:
 - a. Temperature: Minus 20 to 104 degrees F.
 - b. Relative Humidity: 0 to 100 percent, rain, snow, freezing rain.
 - c. Corrosive Environment: Chlorine gas.
 - d. NEC Classification: Non-hazardous.

4. Outside, Hazardous:
 - a. Temperature: Minus 20 to minimum 104 degrees F.
 - b. Relative Humidity: 0 to 100 percent rain, snow, freezing rain.
 - c. NEC Classification: Class 1, Division 1, Group D.

1.07 WARRANTY

- A. The CONTRACTOR shall provide a warranty for all components for a period of two (2) years in accordance with the General/Supplementary Conditions beginning from the date of Final Completion.

PART 2 PRODUCTS

2.01 GENERAL

- A. There is one existing PLC control panel in the existing control building. This PLC panel shall be replaced as part of the HPU replacement.
- B. If three or more manufacturers are called out, then only any one of those manufacturers can be provided and therefore there shall be “no substitutes”.

2.02 ENCLOSURES

- A. Construction:
 1. NEMA 12 Enclosures: These enclosures shall be for indoor use only and shall provide a degree of protection against dust, dirt dripping water and external condensation of non-corrosive liquids.
 - a. Control enclosures shall be constructed of 14 gauge steel minimum, with continuously welded seams. All seams shall be ground smooth.
 - b. Body stiffeners shall be added where required to prevent the enclosures from sagging or bowing.
 - c. Enclosures shall have piano type hinged doors with neoprene gaskets.
 - d. Enclosure doors shall be held closed by a 3-point roller latching mechanism operated by an oil-tight key-locking handle.
 - e. A minimum of two removable lifting eyes shall be attached to the top of floor mounted enclosures.
 - f. Print pocket shall be attached to one door of each enclosure.
 - g. Mounting plates/ panels shall be of one piece construction 14 gauge steel minimum. The panel shall cover most of the rear of the enclosure and shall be painted gloss white. Where required, panels shall be mounted on the sides of the enclosures for additional mounting space.
 - h. Manufacturers:
 - 1) Hoffman Engineering Company
 - 2) Saginaw Control & Engineering (SCE)
 - 3) APX
 2. NEMA 4X Stainless Steel Enclosures: These enclosures shall be for indoor or outdoor use to provide a degree of protection against falling rain, splashing water and hose-directed water.

- a. Control enclosures shall be constructed of 14 gauge minimum 316L stainless steel with continuously welded seams. All seams shall be ground smooth.
- b. Body stiffeners shall be added where required to prevent the enclosure from sagging or bowing.
- c. Enclosures shall have 316L stainless steel piano type hinged doors with neoprene gaskets.
- d. Enclosures mounted in an inside location shall have doors held closed by a 3-point roller latching mechanism operated by an oil-tight key-locking handle.
- e. Enclosures mounted in an outside location shall have enclosure doors held closed by 316L stainless steel screws and clamps on three sides of door. The door shall be provided with a padlocking hasp and staple.
- f. A minimum of two removable lifting eyes shall be attached to the top of floor mounted enclosures.
- g. Print pocket shall be attached to one door of each enclosure.
- h. Mounting plates/ panels shall be of one piece construction 14 gauge steel minimum. The panel shall cover most of the rear of the enclosure and shall be painted gloss white. Where required, panels shall be mounted on the sides of the enclosures for additional mounting space.
- i. Manufacturers:
 - 1) Hoffman Engineering Company
 - 2) Saginaw Control & Engineering (SCE)
 - 3) APX

2.03 SELECTOR SWITCHES

A. Construction:

1. Selector switches shall be 30.5 mm, heavy duty, corrosion resistant, non-illuminated, and suitable for the NEMA rating of the enclosure.
2. Switches shall have double-break silver contacts.
3. Provide maintained contacts unless otherwise indicated on the Drawings.
4. Provide auxiliary contact blocks where indicated on the Drawings or in the Description of Operation or where required for correct operation.
5. Provide legend plates for each switch.

B. Spare Parts:

1. Provide one of each type of selector switch and contact block and accessory used on the project.

C. Manufacturers:

1. Square D, Type 9001
2. Cutler Hammer
3. Siemens
4. Senasys

2.04 PUSH BUTTONS

A. Construction:

1. Push buttons shall be black, 30.5 mm, heavy duty, corrosion resistant, non-illuminated type with replaceable contact blocks, and suitable for the NEMA rating of the enclosure.
2. Provide double-break silver contacts.
3. "Stop" push buttons shall have extended heads.
4. Stop Lockout Stations shall have a locking attachment that will allow the operator to lock the stop button in the depressed position using a standard padlock with a 5/16 inch shackle.
5. Provide legend plates for each push button.

B. Spare Parts:

1. Provide one of each type of push button and contact block and accessory used on the project

C. Manufacturers:

1. Square D, Type 9001
2. Allen Bradley
3. Cutler Hammer
4. Siemens
5. Senasys

2.05 PILOT LIGHTS

A. Construction:

1. Pilot lights shall be 30.5 mm, heavy duty, corrosion resistant, push-to-test, 120 VAC LED lamps, and suitable for the NEMA rating of the enclosure.
2. Voltage rating shall be as indicated on the drawings.
3. Provide colored lens; green for "off" or "closed", red for "on" or "open", amber for "fault" or "motor on low speed" (two speed motors), blue for "status" and white for "indication" unless otherwise noted on Drawings.
4. Provide legend plates for each pilot light.
5. In lieu of push-to-test pilot lights, the lamp circuits design can use a common push-to-test spring return pushbutton to illuminate all pilot lights simultaneously.

B. Spare Parts:

1. Provide one of each type of push button and contact block and accessory used on the project
2. Provide one spare lens of each color used on the project.
3. Provide 10% spare and not less than 6 of each lamps of each color used on the project.

C. Manufacturers:

1. Square D, Type 9001
2. Allen Bradley
3. Cutler Hammer
4. Siemens
5. Senasys

2.06 CIRCUIT BREAKERS

- A. Construction:
 - 1. In general, provide circuit breakers for control panel circuit protection where possible in lieu of fuses and fuse holders.
 - 2. Provide UL listed supplementary protectors for general control enclosure circuit protection applications up to 30 Amperes.
 - 3. Provide circuit breakers as indicated on the project drawings and as required to make a complete project.
 - 4. The circuit breaker shall be able to be used as a disconnecting means.
 - 5. Identify each circuit breaker with a permanent machine printed marking in accordance with the wiring diagrams shown on the project drawings or as submitted to uniquely identify all components.
 - 6. Circuit breaker AIC ratings are to be suitable for the available fault current in the system at the location where the control panel is installed.
- B. Spare Parts:
 - 1. Provide 10% installed spare circuit breakers in each enclosure for each type used on the panel.
- C. Manufacturers:
 - 1. Square D, Telemecanique
 - 2. Allen Bradley
 - 3. Phoenix Contact
 - 4. Siemens

2.07 NETWORK SWITCH

- A. Provide Cisco as follows(minimum):
 - 1. 6 port; 4- 10/100 and two fiber ports
 - 2. LAN Base software
 - 3. Power supply as required
 - 4. Layer 2/3
 - 5. DIN Rail Mount
 - 6. Cisco Part # IES-2000-4TS-B

2.08 ALARM HORNS

- A. Construction:
 - 1. Alarm horns shall be flush mounted as indicated on the Drawings. Voltage rating shall be 120 VAC. Provide adjustable three to five minute timer to silence the horn automatically.
- B. Spare parts:
 - 1. Provide one spare alarm horn for each type used on the project.
- C. Manufacturers:
 - 1. Federal Signal model 350

2. Panel alarm
3. Or approved equal

2.09 TERMINAL FUSE BLOCKS

A. Construction:

1. Terminal fuse blocks shall be provided as indicated on the project drawings. The terminal fuse blocks shall be able to be used as a disconnecting means and shall be provided with a blown fuse indication. Each terminal fuse block shall be identified with a permanent machine printed marking in accordance with the terminal fuse block number shown on the project drawings.
2. Fuse Terminal Blocks shall be designed for din rail mount. Provide fuse inserts for midget fuses, rated 300VAC or higher
3. Provide light indicator for energized Circuit.

B. Spare Parts:

1. Provide 20% spare terminal fuse blocks in each enclosure.

C. Manufacturers:

1. Marathon
2. Phoenix
3. Allen Bradley
4. Square D
5. Weidmuler

2.10 TIMING RELAYS

A. Construction:

1. Relay coil voltage 120 VAC, 60 Hertz
2. Relay shall be solid state, timing ranges and type of delay (on, off, etc) shall be made by changing out plug inserts into the relay base.
3. Contacts shall be rated at a minimum of 10 Amps at rated voltage.
4. A minimum of two (2) timed contacts per relay shall be provided.
5. Relays shall plug into an 8 or 11 pin octal single tier screw terminal socket.
6. Provide general purpose relays as required to extend fan out of timing relays where needed.

B. Spare Parts:

1. Provide 10% spare, but not less than two of each type provided on the project.

C. Manufacturers:

1. Square D class 8501 (2 & 3 pole); Square D Telemecanique (> 3 poles)
2. Allen Bradley
3. Relco
4. IDEC
5. Tyco (Potter & Brumfield KRPA)
6. Tyco (Agastat)
7. Or approved equal

2.11 PROCESS INDICATORS

A. Construction

1. Provide digital indicators capable of accepting an analog signal and provide continuous indication on the front panel display.
2. Provide auxiliary alarm relays.
3. Provide an isolated analog output equal to the input signal.
4. The indicator shall be provided in nominal 2-inch by 4-inch case suitable for panel mounting.
5. Provide display with ability to scale inputs to adjustable and configurable engineering units via faceplate programming functions.
6. The display will be able to provide scaled indication of the measured value and will be configurable via front accessed pushbuttons.
 - a. Selectable input: 4-20 mA (20 Ohm), 0-5 VDC, 1-5 VDC, 0-10 VDC
 - b. Selectable output: 4-20 mA (20 Ohm), 0-5 VDC, 1-5 VDC, 0-10 VDC
 - c. Display: 4-1/2 digit, 7-segment LED
 - d. Accuracy: $\pm 0.05\%$ of reading ± 1 lsd
 - e. Built-in excitation: 24 Vdc @ 25 mA
 - f. Power Requirements: 115 VAC
 - g. Mounting: Recessed on panel door; gasketed and rated for NEMA 4X service.
 - h. Alarm Relays: 2 SPDT form C, 2 Amps @ 250 VAC.

B. Spare Parts:

1. Provide one spare process indicator of each type used on the project.

C. Manufacturers:

1. Precision Digital ProVu-PD6000(design basis)
2. Red Lion
3. Action Instruments
4. PR Electronics

2.12 ENCLOSURE LIGHTING

- ### A.
- Provide LED lighting kits for all floor mounted control enclosures. Lighting kits supply voltage shall be 115 VAC, 60 hertz with terminal block for electrical connections. Lighting kits shall use remote mounted door activated switch. LED bulb shall be two foot long where practical. Provide rigid metal construction with heavy duty mounting bracket and lens protector for bulb.

B. Manufacturers:

1. Hoffman Engineering Company
2. Saginaw Control & Engineering (SCE)
3. Or approved equal

2.13 GROUND FAULT INTERRUPT (GFI) RECEPTACLE

- A. Provide one (1) 15 Amp duplex GFI receptacle in the inside of the enclosure for all enclosures that may require programming with a lap top computer or hand held programmer requiring 115 VAC supply.
- B. Manufactures:
 - 1. Hubbel
 - 2. Leviton
 - 3. Phoenix Contact

2.14 FUSES

- A. Construction:
 - 1. All fuses shall be sized per NEC Code, in accordance with equipment manufacturer's recommendations, and as required for the application.
 - 2. Provide midget fuses, rated 300 VAC or higher.
- B. Spare Parts:
 - 1. Provide 10% spare fuses and not less than 10 of each type provided with the system.
- C. Manufacturers:
 - 1. Bussman
 - 2. Littlefuse
 - 3. Gould / Ferraz / Shawmut
 - 4. Or Approved Equal

2.15 FUSE HOLDERS

- A. Construction:
 - 1. Provide midget enclosed fuse holders for general control enclosure fuse applications up to 30 Amperes.
 - 2. Provide fuse holders as indicated on the project drawings and as required to make a complete project.
 - 3. The fuse holders shall be able to be used as a disconnecting means.
 - 4. Provide fuse holders with blown fuse indication.
 - 5. Identify each fuse holder with a permanent machine printed marking in accordance with the terminal fuse block number shown on the project drawings.
- B. Spare Parts:
 - 1. Provide 10% installed spare fuse holders in each enclosure for each type used i.
- C. Manufacturers:
 - 1. Marathon MIK5
 - 2. Phoenix
 - 3. Allen Bradley
 - 4. Square D

5. Weidmuler
6. Or Approved Equal

2.16 TERMINAL BLOCKS

A. Construction:

1. Terminal blocks shall be provided for all external connections. The spare points shall be so arranged that each series of blocks in a given area shall have a reasonable proportion of the spare points. Each spare input/output and annunciator point shall be wired to identified terminal blocks for connections.
2. Terminal blocks shall be rated for 300 volts, 30 amperes, barrier-type screw terminals. Terminal blocks shall be furnished with compression terminals. Where possible, solderless spade tongue connectors with insulating sleeves shall be used for connecting wires to terminal blocks. Each terminal shall be identified by a suitable engraved or painted wire number on the marking strip attached to the block. No more than two wires shall be connected to any one terminal. Electrical power, control and alarm wiring shall be terminated in terminal block assemblies separate and apart from terminal blocks used for analog signal wiring. Splices are not permitted in control panels, all wiring shall terminate on terminals.

B. Spare parts:

1. Provide 20% installed spare terminal blocks in each control panel for each type of terminal block provided on the panel.

C. Manufacturers:

1. Marathon MIK5
2. Phoenix
3. Allen Bradley
4. Square D
5. Weidmuler
6. Or Approved Equal

2.17 DC POWER SUPPLIES

A. Construction:

1. Provide linear regulated power supplies
2. Provide redundant DC power supplies for all control enclosures.
3. Provide separate DC power supplies as required to power instruments requiring external power.
4. Power supplies shall convert nominal 120 VAC, 60 Hertz power to 24 VDC power.
5. Output, overvoltage, and overcurrent protective devices shall be provided with the power supply to protect the instruments from damage due to power supply failure and to protect the power supply from damage due to external failure.
6. Power supplies shall be sized with a minimum of 100% spare capacity. Submit load calculations showing margin with product information shop drawing.
7. Power supplies shall be configured for DIN rail mounting.

8. Power supplies shall be mounted in accordance with the manufacturer's recommendations to meet or exceed the manufacturers' ventilation and heat dissipation requirements.
9. Power Supply shall be UL listed
10. Ambient Operational Temperature: -20 °C to 71 °C (-4 °F to 160 °F)

B. Spare parts

1. Provide 10 percent spare, but not less than one complete unit of each type of power supply provided on the project.

C. Manufacturers:

1. Accopian, Gold Box
2. Phoenix Contact
3. Sola
4. Or Approved Equal

2.18 GENERAL PURPOSE RELAYS

A. Construction:

1. Provide all relays which may be required to make a complete system.
2. Relays shall be designed for multiple switching applications as indicated on the drawings.
3. Standard contact arrangement shall be DPDT rated at a minimum of 10 Amps at rated voltage, with pilot light indicating on/off status.
4. Relays shall plug into an 8 or 11 pin single tier screw terminal socket.

B. Spare Parts:

1. Provide 10% spare, but not fewer than 2, of each type provided on the project.

C. Manufacturers:

1. Square D class 8501 (2 & 3 pole); Square D Telemecanique (> 3 poles)
2. Allen Bradley 700-HA
3. Releco
4. Tyco (Potter & Brumfield KRPA)
5. Tyco (Agastat)
6. Or Approved Equal

2.19 SIGNAL ISOLATORS

A. Construction:

1. Provide isolators in the control panels for 4 to 20 mA signals where required to prevent ground loop problems, i.e., 4 wire transmitter with grounded signal common or loading problems.
2. Isolators shall be modular design to allow easy replacement of the unit.
3. Provide isolators with field configurable input and output ranges.
4. Provide isolators that are DIN mounted and 24 VDC powered unless otherwise shown on the drawings.

- B. Spare parts:
 - 1. Provide 10% spare, but not less than two of each type provided on the project.
- C. Manufacturers:
 - 1. Phoenix Contact
 - 2. AGM
 - 3. Action Instruments
 - 4. PR Electronics
 - 5. Or Approved Equal

2.20 BRANCH CIRCUIT POWER SURGE PROTECTIVE DEVICES (SPD-A1)

- A. Construction:
 - 1. Provide 120VAC or other primary voltage rated power line surge protective devices (SPDs) where shown on the drawings and for power input to every control enclosure.
 - 2. SPDs are to be ANSI/IEEE C62.41 category A3 rated and series connected.
 - 3. SPDs are to be UL 1449 3rd edition compliant
 - 4. Minimum Performance Specifications:
 - a. Provide clamping envelope that follows the AC sine-wave contour.
 - b. Maximum Continuous Current: as indicated on the drawings.
 - c. Maximum Continuous Operating Voltage: 150Vac.
 - d. Short Circuit Current Rating: 5kA
 - e. Rated Single-Pole Transient Energy (10/1000 micro-Second, Joules): L-N 336J, L-G 168J, N-G 168J.
 - f. Noise Rejection @ 50 Ohms, 5kHz to 100MHz: -20dB to -40dB.
 - g. Operating Frequency Range: 50/60Hz.
 - h. Peak Clamping Voltage (8/20 micro-Second, 3000 Amps, Volts): L-N 330V, L-G 330V, N-G 400V.
 - i. Operating Temperature Range: -10 to 60 Degrees C.
 - 5. Provide visual alarm when surge protection is lost. Provide isolated contact for remote monitoring. Device shall continue to provide power to the load in the event that surge protection is lost.
- B. Spare Parts:
 - 1. Provide ten percent spare, but not less than one of each type used on the project.
- C. Manufactures:
 - 1. Leviton Cat. No. 51020-WM
 - 2. Phoenix Contact: PT2-PE/S-120VAC
 - 3. Cutler Hammer, Aegis
 - 4. Or Approved Equal

2.21 ANALOG SIGNAL AND DATALINE SURGE PROTECTIVE DEVICE (SPD-A2)

- A. Construction:

1. All 4-20mA instrument loop analog signal and EIA RS-232, RS-422, RS-423, RS-485 standard interface data communication surge protectors shown on the drawings or provided as part of this work are to be ANSI/IEEE C62.41 category A3 rated and series connected SPD..
2. Minimum Performance Specifications @ 28V L-G and 25 degrees C:
 - a. Provide heavy-duty, multi-staged protection.
 - b. Surge Life (10/1000 micro-Second): >100 operations with 200 Amps.
 - c. Surge Life (8/20 micro-Second): >10 operations with 10,000 Amps.
 - d. DC Leakage Current at Rated L-G Voltage: >10 micro-Amps.
 - e. Signal/Data Attenuation at Maximum Data Rate: 3dB with 600 Ohm termination.
 - f. Operating Temperature Range: -40 to 60 Degrees C.
 - g. Response Time: 50 pico-Seconds.
 - h. Maximum Data Rate: 4 MHz.
 - i. Peak Clamping Voltage (8/20 micro-Second, 5000 Amps): L-L 55 Volts.
 - j. Peak Clamping Voltage (8/20 micro-Second, 1000 Amps): L-L 45 Volts.
 - k. Load Current: 150 mA.
 - l. Series Resistance: 22 Ohms.

B. Spare Parts:

1. Provide ten percent spare, but not less than one of each type used on the project.

C. Manufacturers:

1. Phoenix Contact: PT 1x2-24VDC-ST or PT 2x2-24VDC-ST
2. Bourns, 1800 Series
3. Or Approved Equal

2.22 NAMEPLATES

A. General: All nameplates shall conform to ISA Recommended Practice publication ISA-RP60.6.

B. Construction:

1. Nameplates shall be used to display basic information including function.
2. Letters shall be gothic upper case (capital letters), minimum height shall be 1/8 inch with a 3/64 inch space between lines.
3. Nameplates shall be made of laminated engraving stock having a black core with a white surface.
4. The characters shall be engraved using an industry standard engraving machine.
5. Nameplates shall be attached to the enclosure using double-faced pressure-sensitive tape. Where the environment is not conducive to tape i.e. outdoors, NEMA 4, 4X, and 3R environments stainless steel screws shall be used in place of the tape.
6. Enclosure identification nameplates shall be larger sized letters, 3/16 inch minimum.
7. Abbreviations shall conform to appendix B of ISA Recommended Practice publication ISA-RP60.6.

8. Margins shall conform to the following:
 - a. With holes
 - 1) Top/bottom - 1/16" min
 - 2) Sides left/right - 5/16" min
 - b. Without holes
 - 1) Top/bottom - 1/16" min
 - 2) Sides left/right - 1/8" min

2.23 LEGEND PLATES

- A. General: All legend plates shall conform to ISA Recommended Practice publication ISA-RP60.6.
- B. Construction:
 1. Legend plates shall be used to display basic functions of push buttons, selector switches and pilot lights.
 2. Letters shall be gothic upper case (capital letters), minimum height shall be 1/8 inch with a 3/64 inch space between lines.
 3. Legend plates shall be made of laminated engraving stock having a black core with a white surface.
 4. The characters shall be engraved using an industry standard engraving machine.
 5. Legend plates shall be held to the enclosure by the ring nuts used to hold the operator in place.
 6. All legend plates for a particular panel shall be of the same size and shape.
 7. Standard Selector Switch legends shall include: (1) Hand/Off/Auto; (2) Local/Remote; (3) Off/On.
 8. Standard Push Button legends shall include: (1) Start; (2) Stop; (3) Stop Lockout; (4) Low; (5) High; (6) Reset

2.24 WIRE MARKERS

- A. General: All wire markers & tags shall conform to ISA Recommended Practice publication ISA-RP60.6.
- B. Construction:
 1. Each wire shall be identified on both ends of the wire with heat shrink, thermal transfer tube type wire markers. Do not heat-shrink to cable, leave loose for accessing cable ID number.
 2. Adhesive labels are not acceptable.
 3. The wire markers shall be white with black lettering. Hand marking of the label is not acceptable.
 4. The wire marker number shall be a unique number, incorporates the instrument / equipment tag number if applicable, shall be easily cross referenced with schematic drawings, and shall have the same number on both sides of the wire.
- C. Manufacturers:
 1. Brady

2. Or approved equal

2.25 ADHESIVE LABELS

- A. General: All labels shall conform to ISA Recommended Practice publication ISA-RP60.6.
- B. Construction:
 1. Adhesive labels shall be used inside the panel to identify equipment.
 2. The labels shall be smudge proof and shall have an adhesive back. The printing on the labels shall be done by mechanical means only.

2.26 WIRE

- A. All wiring shall conform to Nation Electric Code's latest revision Article 310 - "Conductors for General Wiring," table 310-17. All wire shall be copper.
- B. Power Wiring shall be annealed, tin coated, class B stranded, soft copper, conforming to ASTM Stranded B-8. Conductor size shall be #12AWG through 750kcmil. Insulation shall be rated 600V.
- C. Control wiring inside of the control panel assemblies shall be annealed, tin coated, class B stranded, soft copper, conforming to ASTM Stranded B-8. Conductor size shall be #16AWG. Insulation shall be rated 600V.
- D. All analog signal wiring shall be stranded soft copper. Conductor size shall be #16AWG. The insulation shall be 300V. Drain wires shall be grounded at the panel only. Exposed shield wire shall be protected with a PTFE electrical insulation tubing for the continuous length until terminated, to help guard against ground noise.

2.27 WIRE DUCT

- A. Wires shall be run in open slot vinyl wire duct with covers. AC wire duct shall be gray and labeled with "AC" and DC wire duct shall be white and labeled with "DC". Wire duct shall be held to the back plate with round head machine screws and washers. Wire duct shall be filled no more than 75%. Where it is not practical to use wire duct, wire ties shall be used to bundle the wires together in a neat and professional manor.
- B. Manufacturer:
 1. Panduit
 2. Thomas & Betts
 3. Or Approved Equal

2.28 GROUNDING PRODUCTS

- A. Two 1/4" thick x 1" wide x required length (for required ground wires plus 10% spare mounting points) minimum copper ground bus bars shall be supplied with each enclosure.
- B. One ground bus shall be a chassis (non-isolated) ground bus that is electrically bonded to the panel and shall be used to ground all equipment. All equipment ground wires shall be run directly from the equipment to the chassis ground bus.
- C. The other ground bus shall be an isolated ground bus and shall be used to ground the drain wire of signal wiring. No more than 5 drain wires shall be jumpered together before being run to the isolated ground bus. The isolated ground bus shall be connected to the chassis ground bus with one piece of 6 gauge green wire.
- D. Connect the following SPD devices to the chassis ground bus with a dedicated green colored ground conductor that is a minimum #6 AWG:
 - 1. Branch Circuit Power Surge Protective devices (SPD-A1)
 - 2. In existing WCP's utilize the current ground bar for SPD grounding.
- E. Connect the following SPD devices to the chassis ground bus with a dedicated green colored ground conductor that is a minimum #12 AWG:
 - 1. Analog Signal and Dateline Surge Protective device (spd-A2)
- F. The SPD ground conductor shall be as short as possible. Reliance on the SPD mounting channel alone for the ground connection is not acceptable.
- G. Manufacturer:
 - 1. Harger
 - 2. Georgia Copper, LLC
 - 3. TGB & TMGB
 - 4. Storm Copper Components, Co.
 - 5. Chatsworth Products, Inc.
 - 6. Or Approved Equal

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install as shown on the approved shop drawings and according to the manufacturer's requirements.

3.02 EQUIPMENT INSTALLATION

- A. Control panels with 480V supply source shall have a well designed disconnecting means that extends through the panel front cover. This disconnect will shut off a main circuit breaker inside the control panel and be lockable in the off position with a standard padlock.

- B. Control voltages shall not exceed 120 VAC. Control transformers shall be sized one size larger than the computed load and be protected by properly sized fuses or circuit breakers on the primary and secondary sides.
- C. Fasten all devices inside the enclosure with steel screws, steel bolts, and/or other means as appropriate. For devices without distinct means for fastening, provide suitable metal bracket or mounting adapter as a means for fastening. Fasten devices that plug directly onto power receptacles with self-locking nylon tie wraps to the receptacle or support for the receptacle. No device shall be permitted to be laid loose inside the enclosure.
- D. All exposed electrical terminations in the enclosure shall be guarded or covered to eliminate the possibility of accidental contact by an object the size of an average finger. Provide appropriate additional protection where this requirement is not met. Provide appropriate warning labels for voltage levels used within the enclosure.
- E. Enclosure components that are electrically connected to devices external to the building that the enclosure is located shall be protected with surge protectors in accordance with the SPD specifications of this Section. Segregate all SPD devices by types and size. Locate the SPD devices as close, as practical, to the non-isolated ground bus in the enclosure.
- F. Provide fuse and fuse terminal blocks with blown fuse indicators for all PLC analog inputs, PLC analog outputs, and PLC discrete inputs provided in the control panel.
- G. All PLC discrete outputs provided in the control panel shall be provided with an interposing relay, unless otherwise noted on the drawings.
- H. Provide fuse and fuse terminal blocks with blown fuse indicators for each power circuit required for field instruments powered by the control panel.
- I. Bond the negative of the 24 VDC power supplies to ground.

3.03 WIRING

- A. Drain wires shall be grounded at the panel only. Exposed shield wire shall be protected with a PTFE electrical insulation tubing for the continuous length until terminated, to help guard against ground noise.
- B. All wiring shall conform to the following color code:
 - 1. 480 VAC power, 3-phase: Phase A-Brown; Phase B-Orange; Phase C-Yellow
 - 2. 120 VAC power, 1-phase: Line-Black; Neutral-White
 - 3. 120 VAC control wires – red
 - 4. 120 VAC externally powered – yellow
 - 5. 24 VDC – (+)-Blue; (-) or common-Blue/white
 - 6. Ground – Green

- C. To avoid inductive pickup AC power wiring or AC control wiring shall have a maximum possible separation from DC analog signal or DC control wiring. A practical distance is not less than 6 in. If power wiring has to cross the signal wiring, the crossing should be as close to a right angle as possible.
- D. A maximum of two conductors shall be connected to any one terminal.
- E. Wire splices are not permitted within the enclosure.
- F. Wire and cable mounting methods
 - 1. Metallic Enclosures: The use of self-adhesive type cable tie mounting pads is prohibited. Wires, wire bundles, and cables that are not routed through wire duct shall be supported utilizing stud-mounted nylon or neoprene bushed steel loop-type cable clamps. The maximum distance between mounting points shall be 12 inches. Cables mounted on enclosure doors shall have a minimum of three mounting points.
 - a. Threaded mounting studs shall be 1/8 inch in diameter or larger as required and made of the same material as the cabinet. The cable clamp shall be retained with:
 - 1) One nylon washer between the nylon clamp and panel
 - 2) One metal washer and metal/nylon locking nut on top of the clamp
 - 2. Non-Metallic Enclosures: The use of self-adhesive type cable tie mounting pads is prohibited. Wiring, wire bundles, and cables that are not routed through wire duct shall be supported utilizing epoxy type cable mounting systems that are designed for the application. The maximum distance between mounting points shall be 12 inches. Cables mounted on enclosure doors shall have a minimum of three mounting points. The mounting surface of the enclosure where the epoxy type cable mount is going to be installed shall be prepared in accordance with the manufacturer's written instructions.
- G. Where wire is required to flex often (i.e. around door hinges) or susceptible to damage; high strand wire and spiral wrap shall be used. Route and secure wires so that they will twist and not bend around the hinge.
- H. Provide at least 20% installed spare I/O of each type in each control enclosure by adding spare I/O modules as necessary. Spare and not-used I/O is to be fully wired to terminal blocks in the same manner as the used I/O.
- I. Wires that are not de-energized by the main breaker shall be of the same color and labeled with a warning label stating same.
- J. Control power and neutral shall not be jumped from device to device. Power distribution blocks shall be used.
 - 1. Manufacturers:
 - a. Square D class 9080
 - b. Allen Bradley Bulletin 1492
 - c. Phoenix Contact

d. Weidmuller

3.04 PAINTING

- A. Interior and exterior surfaces of all enclosures shall be thoroughly cleaned and painted with rust-inhibitive primer.
- B. The interior and mounting plates shall be painted white with polyurethane enamel. All pits and blemishes in the exterior surface shall be filled.
- C. Exterior surface shall be smooth and painted with two coats to a film thickness of 4 mils.
- D. Paint color for carbon steel enclosures shall be ANSI 61 Gray, polyurethane enamel.
- E. One pint of finish color paint shall be furnished with the panels to repair future scratches.
- F. Stainless Steel enclosures shall not be painted but shall have a “brushed” finish.

3.05 TESTING

- A. Test all outputs and inputs to demonstrate that the gate operators perform all control functions as programmed by the CONTRACTOR; also demonstrate local operation from the Control Panel and from the existing remote HMI. Demonstrate that the Slide gates can meet all the functions as listed in Section 41 24 26 – Hydraulic Power Unit.

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Requirements for basic electrical materials, material handling, and other basic electrical materials and methods.

B. Related Sections:

1. Section 01 33 00 – Submittal Procedures
2. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables.
3. Section 26 05 26 – Grounding and Bonding for Electrical Systems.
4. Section 26 05 28 – Hangers and Supports Systems for Electrical Systems
5. Section 26 05 63 – Acceptance Testing of Electrical Systems.
6. Section 26 05 33.13 – Conduits for Electrical Systems.

1.02 REFERENCES

A. Reference Standards:

1. America National Standards Institute (ANSI):
 - a. ANSI Z535.4, Product Safety Signs and Labels.
2. American Society of Mechanical Engineers (ASME):
 - a. ANSI/ASME Y14.2M, Line Conventions and Lettering.
 - b. ANSI/ASME Y14.24M, Types and Applications of Engineering Drawings.
 - c. ANSI/ASME Y14.34M, Associated Lists.
 - d. ANSI/ASME Y14.35M, Revision of Engineering Drawings and Associated Documents.
 - e. ANSI/ASME Y14.100, Engineering Drawing Practices.
3. Institute of Electrical and Electronic Engineers (IEEE):
 - a. ANSI/IEEE 18, Standard for Shunt Power Capacitors.
 - b. ANSI/IEEE 141, Recommended Practice for Electric Power Distribution for Industrial Plants - Red Book.
 - c. ANSI/IEEE 242, Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems - IEEE Buff Book.
 - d. ANSI/IEEE 399, Recommended Practice for Power Systems Analysis - Brown Book.
 - e. ANSI/IEEE 519, Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems.
 - f. IEEE 1036, Guide for Application of Shunt Power Capacitors.

- g. ANSI/IEEE 1584, Guide for Arc-Flash Hazard Calculations.
- h. ANSI/IEEE C37.10, Guide for Diagnostics and Failure Investigation of Power Circuit Breakers.
- i. ANSI/IEEE C37.13, Low-Voltage AC Power Circuit Breakers Used in Enclosures.
- j. ANSI/IEEE C57.12.00, General Requirements for Liquid-Immersed Distribution, Power and Regulating Transformers.
- k. ANSI/IEEE C57.12.59, Standard for Dry-Type Transformer Through-Fault Current Duration
- 4. InterNational Electrical Testing Association, Inc. (NETA):
 - a. ANSI/NETA ETT Standard for Certification of Electrical Testing Technicians.
- 5. National Electric Manufacturer's Association (NEMA).
 - a. ANSI/NEMA MG 1, Motors and Generators.
 - b. NEMA ICS 6, Industrial Control and Systems: Enclosures.
- 6. National Electrical Contractors Association (NECA)
 - a. ANSI/NECA 100 Symbols for Electrical Construction Drawings.
- 7. National Fire Protection Association (NFPA):
 - a. NFPA 70, National Electrical Code (NEC).
 - b. NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces.
- 8. The Society for Protective Coatings (SSPC):
 - a. SSPC-SP 1, Solvent Cleaning.
 - b. SSPC-SP 2, Hand Tool Cleaning.
 - c. SSPC-SP 3, Power Tool Cleaning.
- 9. Other Published References:
 - a. Electrical Safety Handbook, by John Cadick, McGraw Hill, Inc., Article on Safety Electrical One-Line Diagrams.

1.03 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Provisions and all Supplementary General Provisions.
 - 1. Product Data:
 - a. Submit Product Data, including catalog cuts, for all products provided for the electrical work of this Contract and as specified in other Sections.
 - 1) Clearly indicate the specific products proposed for the project by use of arrow, circle or underline. Indicate usage of each product on each submittal.
 - 2. Shop Drawings:
 - a. Submit Shop Drawings for the electrical work of this Contract as specified in other Sections.
 - 3. Quality Assurance/Control Submittals:

- a. Certificates:
 - 1) Testing agency quality verification that all products meet requirements or manufacturer disclaimer statements.
- b. Qualification Statements:
 - 1) Testing agency qualifications.
- 4. Closeout Submittals:
 - a. Operation and Maintenance Manuals.
 - b. See also Specification Section 01 78 00, Closeout Submittals.

1.04 SUBSTITUTIONS, BASIS OF DESIGN, AND ACCEPTABLE MANUFACTURERS

- A. All substitutions to identified materials or equipment shall comply with the applicable requirements of the General Provisions and all Supplementary General Provisions. In any case of conflict between such requirements of the General Provisions and all Supplementary General Provisions and this paragraph, the more stringent requirements shall govern.
- B. Whenever an item of material or equipment is identified by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function and quality required. Unless the identification or description contains or is followed by words reading that no like, equivalent or “or-equal” item or no substitution is permitted, material or equipment of other Suppliers may be proposed.
- C. Where substitutions to identified items are permitted, any proposed substitution or alternate must fully comply with the following in order to be considered by the ENGINEER:
 - 1. Be of a reputable manufacturer,
 - 2. Be fully compliant with the requirements of this Section and the Drawings,
 - 3. Be fully compatible with all interfacing items and work, and with the installation environment,
 - 4. Be appropriate (as determined by the ENGINEER) for the proposed application, and
 - 5. Be equivalent (as determined by the ENGINEER) in character, performance, and quality to any identified Basis of Design.
- D. Where a specific manufacturer or product is identified as the Basis of Design or listed first in a list of acceptable manufacturers, the overall project design is based on the identified manufacturer or product. If the Contractor elects to substitute a manufacturer or product which differs from the identified Basis of Design, the Contractor shall bear all efforts and costs of any design changes necessary in order to achieve finished work which is equal in character, performance, and quality to the original design depicted in the Contract Documents. Such changes shall include, but

not necessarily be limited to: changes to ratings and/or features of other equipment, changes to material sizes and/or types, new material and/or equipment, and changes to structural and/or architectural features (including room sizes). Approval by the ENGINEER of a proposed substitute item shall not relieve the Contractor of this responsibility.

- E. The listing of specific manufacturers is solely intended to identify reputable manufacturers who are known to provide quality products of the general type specified. Such listing is in no way intended to imply that the identified manufacturer's product(s) have been verified to satisfy the specified requirements, or to be equivalent to any identified Basis of Design manufacturer. Nor does such a listing imply acceptance of products which do not meet the specified requirements, ratings, features, dimensions, and functions as indicated.
- F. See also Specification Section 01 33 00 – Submittal Procedure for additional substitution requirements.

1.05 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Testing Agency Qualifications:
 - a. Use a NETA accredited testing agency, or approved equal, that is accredited for the region in which the Contract work is performed.
 - b. Submit the testing agency's qualifications to the ENGINEER for approval.
- B. Regulatory Requirements:
 - 1. Perform all electrical work in conformance with the requirements of NFPA 70, the National Electrical Code.
- C. Certifications:
 - 1. Submit evidence with all Product Data that the products represented meet testing agency quality verification requirements, including agency listing and labeling requirements.
 - a. Such evidence may consist of either a printed mark on the data or a separate listing card.
 - b. Submit a written statement from those product manufacturers that do not provide evidence of the quality of their products that indicates why an item does not have quality assurance verification.
 - 1) Such statements provided in lieu of quality assurance verification are subject to the acceptance of the ENGINEER.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials and equipment to the work site in accordance with the requirements of the General Provisions and Supplementary General Provisions.
 - 1. Deliver materials and equipment in a clean condition.
 - a. Provide packaging that plugs, caps, or otherwise seals openings both during shipping and temporary storage.
 - 2. Provide equipment needed for unloading operations, and have such equipment on the work site to perform unloading work when the material and equipment is delivered.
 - a. If possible, clearly identify pick-points or lift-points on electrical equipment crating and packaging.
 - b. In the absence pick-points or lift-points on equipment crating and packaging, identify pick-points or lift-points on the equipment itself.
- B. Handle materials and equipment in accordance with the requirements of General Provisions and Supplementary General Provisions.
 - 1. Handle materials and equipment in accordance with manufacturer's written instructions.
 - 2. When unloading materials and equipment, provide special lifting harnesses or apparatus as required by manufacturers.
- C. Store electrical materials and equipment, whether on-site or off-site, in accordance with the General Provisions and Supplementary General Provisions and the following:
 - 1. Follow the manufacturer's written instructions for storing the items.
 - 2. Store electrical equipment and products under cover.
 - a. Except for electrical conduit, store electrical equipment and products in heated warehouses or enclosed buildings with auxiliary heat and that provide protection from the weather on all sides.

1.07 SYSTEM STARTUP

- A. Energize the following items in the presence of the ENGINEER:
 - 1. Equipment rated over 300 Volts.
 - 2. Equipment rated over 1-horsepower.
- B. Startup the following items in the presence of the ENGINEER:
 - 1. Process equipment.

1.08 MAINTENANCE

- A. Operation and Maintenance Manuals:
 - 1. Prepare Operation and Maintenance Manuals in conformance with the requirements of Section 01830, and other Contract requirements, and as follows:

- a. Organize Operation and Maintenance Manuals by Specification Section and equipment number as designated on the Contract Drawings.
 - b. Include suppliers, supplier addresses, and supplier telephone numbers for the equipment and products furnished.
2. 60 days prior to the request for final payment, prepare and submit two copies of the proposed Operation and Maintenance Manuals to the ENGINEER for approval.
3. Upon approval of the proposed Operation and Maintenance Manuals, submit six corrected copies as follows:
 - a. Submit one set to the ENGINEER.
 - b. Place one set in the spare parts and fuse cabinet in the new electrical service building
 - c. Deliver the remaining four copies to the ENGINEER.
4. Insert final record drawings in each set of Operation and Maintenance Manuals at Project Closeout.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Grounding and Bonding Materials:
 1. Provide grounding and bonding materials in accordance with the requirements of Section 26 05 26.
- B. Hangers and Supports:
 1. Provide hangers and supports for electrical equipment in accordance with the requirements of Section 26 05 28.
- C. Electrical Identification Materials:
 1. Coordinate identification of electrical work products with the ENGINEER.
- D. Wire and Cable:
 1. Provide low-voltage electrical wire, cable, and accessories in accordance with the requirements of Section 26 05 19.
- E. Conduit and Raceway:
 1. Provide conduit and raceway as indicated, as appropriate for the application per NFPA 70, and in accordance with the following:
 - a. Conduit and Tubing: Provide electrical conduit and tubing in accordance with the requirements of Section 26 05 33.13.

PART 3 EXECUTION

3.01 INSTALLATION

A. Field-Applied Finishes:

1. Except for factory-finished items that have been completely finished with factory-applied primer and final finish coatings, finish installed electrical materials, equipment, apparatus, and items in the field in accordance with the following requirements.
 - a. The galvanized coatings including conduits, nuts, bolts and washers damaged during installation shall be repaired.
 - 1) Lubricants shall be removed in accordance with SSPC-SP1.
 - 2) Rust shall be removed in accordance with SSPC-SP-2 or SSPC-SP-3.
 - 3) The touch-up material shall be compatible with and from the same manufacturer as the coating system to be used for the structure.
 - 4) Subsequent coatings shall be applied within the recoat time recommended by the manufacturer.

3.02 REPAIR/RESTORATION

- #### A. If the factory finish of factory-finished items is damaged for any reason, refinish the item.
1. If an item that has several surfaces has damage on one surface, refinish the entire damaged surface.
 - a. Surface Preparation:
 - 1) Outside the damaged area, lightly sand the entire surface and perform additional sanding to profile the damaged paint edge.
 - 2) Prepare the surfaces of damaged areas in accordance with SSPC-SP 2.

3.03 FIELD QUALITY CONTROL

- #### A. Perform electrical testing as detailed in Section 26 05 63 and in each Specification Section.
- #### B. Have electrical work inspected as required by the local Authority Having Jurisdiction (AHJ).
1. Submit a copy of the certification of inspection with the final project closeout documents, and post the original in the electrical room on-site protected by a metal frame with a protective plate glass cover.
- #### C. The quality of finishing and refinishing work is subject to approval by the ENGINEER.

3.04 MANUFACTURERS' FIELD SERVICES

- A. Provide the services of a qualified field engineer and necessary tools and equipment to test, calibrate, and adjust the protective relays and circuit breaker trip devices as recommended in the Final Project Report of the power system study.

3.05 RECORDING OF CONDUCTOR LENGTHS

- A. Measure and record the lengths of all feeder and branch circuit conductor as follows:
1. Low voltage (600V and less) circuits
 - a. Feeders to panelboards, switchboards, switchgear, motor control centers, transformers, and similar distribution equipment.
 - b. Branch circuits rated 40A or more.
 - c. Branch circuits to motors rated 20hp or more.
 2. All medium voltage circuits
- B. Measure lengths of conductors by pulling a conduit measuring tape into the raceway prior to installing the conductors. Remove the tape from the raceway prior to, or during, installation of the conductors. Use a tape which is marked in maximum 1-foot increments.
- C. Record the measured length of raceway at the time of measuring. Measure and record the conductor lengths between the ends of the raceway and the conductor terminations as a separate notation when the conductors are installed.
- D. Submit recorded lengths in a typewritten spreadsheet format, with five separate columns:
1. Circuit identification
 2. Measured raceway length
 3. Measured length from end of raceways to conductor terminations at first end
 4. Measured length from end of raceways to conductor terminations at second end
 5. Total length

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Requirements for furnishing, installing, connecting, energizing, testing, cleaning, and protecting low voltage cable, shielded cable, and accessories.

B. Related Sections:

1. Section 01 33 00 – Submittal Procedures
2. Section 26 05 00 – Common Work Results for Electrical.
3. Section 26 05 26 – Grounding and Bonding for Electrical Systems.
4. Section 26 05 63 – Acceptance Testing for Electrical Systems.
5. Section 26 05 33.23 – Boxes for Electrical Systems

1.02 REFERENCES

A. Reference Standards:

1. American Society for Testing Materials (ASTM):
 - a. ASTM B 8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
2. Institute of Electrical and Electronic Engineers (IEEE):
 - a. IEEE 383 - Standard for Qualifying Class 1E Electric Cables and Field Splices for Nuclear Power Generating Stations.
 - b. IEEE 1202 - Standard for Flame-Propagation Testing of Wire and Cables.
3. National Electrical Manufacturer's Association (NEMA):
 - a. NEMA WC 26/EEMAC 201 - Binational Wire and Cable Packaging Standard.
 - b. ANSI/NEMA WC 57 - Standard for Control, Thermocouple Extension, and Instrumentation Cables.
4. National Fire Protection Association (NFPA):
 - a. NFPA 70 - National Electrical Code (NEC).
5. Underwriter's Laboratories, Inc. (UL):
 - a. UL 13 - Standard for Power-Limited Circuit Cables.
 - b. UL 1277 - Standard for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.
 - c. UL 1569 - Standard for Metal-Clad Cables.
 - d. UL 1581 - Reference Standard for Electrical Wires, Cables, and Flexible Cords.
 - e. UL 1685 - Standard for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables.
 - f. UL 2250 - Standard for Instrumentation Tray Cable.
6. Insulated Cable Engineers Association (ICEA):

- a. ICEA T-29-520 - Vertical Cable Tray Flame Test @ 210,000 BTU.

1.03 DESIGN REQUIREMENTS

- A. Conductors in Raceway and Conduit Systems:
1. Provide conduit systems for installing the wiring that is outside of equipment.
 2. Except for raceway or conduit for control wires or where otherwise indicated on the Contract Drawings, design raceway and conduit systems so that the maximum number of low-voltage current carrying conductors (per NFPA 70, Article 310) in each raceway or conduit does not exceed three, plus a ground.
- B. Cable Tension Design Requirements:
1. Design conduit runs so that the tension limits set by the wire and cable manufacturers will not be exceeded.
 - a. Provide additional pulling points as required to limit the tension to acceptable levels.
 2. Generate and submit tension cable pulling calculations for all underground power runs.
 - a. Include pull loads, tension, and safety factors for all cables with the calculations.
- C. Product Data and Catalog Cuts:
1. Submit low-voltage ground, power, and control wiring product data as listed below for the products provided as the Work of this Section; and clearly indicate the usage of each product on the data submitted.
 - a. Wires and cables.
 - b. Lugs.
 - c. Connectors.
 - d. Tapes.
 - e. Pulling lubricant.
 - f. Tools used to crimp connectors.
- D. Use of Trade Names:
1. The use of trade names within the Contract Documents is intended to establish the basis of design and to illustrate the constructability and level of quality required.
 - a. The use of trade names is not intended to exclude other manufacturers whose products are equivalent to those named, subject to compliance with Contract requirements.

1.04 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Provisions and all Supplementary General Provisions.
1. Product Data:
 - a. Wires and cables.
 - b. Lugs
 - c. Connectors.

- d. Tape.
- e. Pulling lubricant.
- 2. Samples:
 - a. Wire samples.
- 3. Quality Assurance/Control Submittals:
 - a. Design Data.
 - 1) Tension cable pulling calculations for all underground power runs.
 - b. Certificates.
 - 1) Testing agency/quality verification.
 - c. Manufacturer's Instructions.
 - 1) Cable manufacturer's recommendations.
 - d. Qualification Statements.
 - 1) Documented experience of the installing firm.
 - 2) Qualifications of the licensed electricians supervising the Work.

1.05 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer Qualifications:
 - a. To install the Work of this Section, employ the services of a firm specializing in installing wire, cable, and accessories, and that has a minimum of 3 years experience doing so.
 - 1) Submit the documented experience of the firm installing the wire, cable, and accessories.
 - b. To supervise installation of the Work of this Section, employ licensed electricians.
 - 1) Submit the qualifications of the licensed electricians supervising the Work of this Section.
- B. Regulatory Requirements:
 - 1. Perform the Work of this Section in accordance with the requirements specified in NFPA 70, and to all other applicable state, local, and national governing codes and regulatory requirements.
- C. Certifications:
 - 1. Provide products that are listed and labeled by Underwriters Laboratory, approved by Factory Mutual, or certified as meeting the standards of UL by the Electrical Testing Laboratory (ETL) for the location installed in, and the application intended, unless products meeting the requirements of these testing laboratories are not available or unless standards do not exist for the products.
 - a. Provide copper conductors listed and labeled by UL for all wiring.
 - 2. Submit evidence of testing agency/quality verification, listing, and labeling for each product with the submitted product data either by providing a printed mark on the data or by attaching a separate listing card.

- a. For items without such evidence, submit a written statement from the product manufacturer that indicates why it does not have quality assurance verification.

D. Field Samples:

1. Submit one 36-inch long sample of each type of wire to be used.

1.06 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling, and Unloading:

1. Imprint insulated conductors with the date of manufacture, the wire type, and the manufacturer.
2. Package wire and cable in conformance with the requirements of NEMA WC 26/EEMAC 201.
3. Protect items from damage during delivery, handling, and installation.
 - a. Comply with the cable manufacturer's recommendations for inspection, handling, storage, temperature conditioning, bending and training limits, pulling limits, and calculation parameters for installing cable.
 - b. Submit the cable manufacturer's recommendations for inspection, handling, storage, temperature conditioning, bending and training limits, pulling limits, and calculation parameters for installing cable

B. Acceptance at Site:

1. Wire and cable manufactured more than 12 months before delivery to the Site is unacceptable for use under this Contract, and will be rejected.

C. Storage and Protection:

1. Store products indoors on blocking or pallets.
2. Protect items from damage during storage.

1.07 PROJECT ENVIRONMENTAL REQUIREMENTS

- A. Install armored instrumentation cable only when the temperature is above -40 degrees Celsius.

PART 2 PRODUCTS

2.01 LOW VOLTAGE CONDUCTORS

A. Conductor Design Requirements:

1. Provide conductors of the proper size and ampacity ratings based on Article 310 of NFPA 70.
 - a. Provide copper conductors that have 98 percent conductivity.
 - b. Unless otherwise indicated on the Contract Drawings, at a minimum provide conductors of the following American Wire Gauge (AWG) sizes:
 - 1) For power and branch feeder circuits: 12 AWG.

- a) For power and branch feeders, provide solid or stranded copper low-voltage conductors for sizes up to and including 10 AWG, provide stranded copper low-voltage conductors for 8 AWG and larger sizes.
 - 2) For control circuits: 12 AWG.
 - 3) For alarm and status circuits: 14 AWG.
 - 4) For single conductor instrument wiring: 14 AWG.
 - 5) For multiple conductor instrument wiring: 16 AWG.
- B. Insulation Design Requirements:
 - 1. Provide low voltage ground, power, and control wiring having the proper insulation types as follows:
 - a. For exterior, wet, and damp locations, including NEMA 4X locations: Type THWN.
 - b. For underground wiring:
 - 1) For sizes 14 AWG through 10 AWG: Type XHHW-2.
 - 2) For sizes 8 AWG and larger: Type RHW-2 or XHHW-2.
 - c. For wiring that is wholly in dry indoor locations: Type XHHW-2, or dual-rated Type THHN/THWN.
 - d. For ground wires: THW may be used at the CONTRACTOR's option.
 - 2. Color Coding of Wires
 - a. [Insulation shall be colored black and wrapped with colored tape per Tables 26 05 19-1, 26 05 19-2 and/or 26 05 19-3 below.]
 - b. [Insulation shall be factory colored per Tables 26 05 19-1, 26 05 19-2 and/or 26 05 19-3 below. The use of tape for color coding is prohibited.]
- C. Manufacturers
 - 1. Acceptable Manufacturers:
 - a. Continental Wire & Cable Company
 - b. SouthWire
 - c. General Cable
 - a. CME Wire & Cable Inc.
 - b. Or approved Equal

2.02 MATERIALS

- A. 600 Volt Rated Multi-Conductor Cable:
 - 1. Provide multi-conductor cable that is suitable for use indoors or outdoors; exposed or concealed; as open wiring; in any raceway, underground duct, or cable tray; direct buried; or embedded in concrete.
 - a. Provide cable that is UL listed as Type MC in compliance with the requirements of UL 1569, and is UL listed for 90 degrees Celsius dry or wet, for direct burial, for cable tray use, and as sunlight resistant.
 - 2. Assemble the cable with non-hygroscopic fillers and binder tape.
 - a. Insulated Conductors:
 - 1) Provide uncoated stranded copper conductors, complying with the requirements of ASTM B 8 for Class B conductors.

- 2) Provide cross-linked polyethylene type XHHW-2 insulation rated for 600 volts.
 - b. Grounding Conductors:
 - 1) Provide uninsulated copper conductors.
 - c. Cover the overall assembly with a single strip of interlocked aluminum tape, and then apply an outer final jacket of black flame-retardant PVC.
 3. Manufacturers:
 - a. General Cable Technologies Corporation,
 - b. The Okonite Company,
 - c. Or approved equal.
- B. Shielded Instrumentation Cable (2/C Cable):
1. Provide 100 percent shielded, two-conductor, 16 AWG twisted pair cable.
 - a. Provide 600V rated NFPA 70 (NEC) Type TC cable.
 - 1) Sunlight resistant
 - 2) Suitable for installation in wet locations
 - 3) Temperature Ratings
 - a) -30 to +75 degree Celsius wet
 - b) -30 to +90 degree Celsius dry
 - 4) Flame Test
 - a) UL 1277 or 1685
 - b) C(UL) FT4
 - c) IEEE 1202
 - 5) Non-plenum
 - b. Conductors:
 - 1) Provide stranded (7 or 19 strand) tin-coated copper conductors.
 - c. Shielding:
 - 1) Provide aluminum-polyester foil shielding that incorporates an 16 AWG stranded tinned copper drain wire.
 - d. Insulation:
 - 1) Provide color coded insulation rated for 600 volts and consisting of either PVC/Nylon or EPR.
 - 2) Provide an overall sunlight resistant PVC or CPE outer jacket.
 2. Acceptable Manufacturers:
 - a. Belden, Inc., Part Number 9342 or 1118R
 - b. Houston Wire and Cable
 - c. Alpha Wire
 - d. West Penn
 - e. Or approved Equal

2.03 ACCESSORIES

A. CABLE PULLING LUBRICATION AND LUBRICANT:

1. Lubricant shall provide reduced tension on all types of cable jackets, dry to a thin lubricating film that retains its lubricity for an extended period and won't cement in the cables.

2. The cable pulling lubricant shall produce a low coefficient of friction on a wide variety of cable jacket materials. The lubricant shall be UL listed. It shall be easy to handle and adhere well to the cable. Where appropriate, it shall also be tested and approved for use with CSPE (chlorosulfonated polyethylene) fire-retardant cable jackets where these materials are utilized.
3. The lubricant shall be UL or CSA Listed and Labeled and shall pass the IEEE 1210, Standard Tests for Determining Compatibility of Cable-Pulling Lubricants with Wire and Cable. It shall pass physical compatibility tests on LLDPE, XLPE, CPE, and PVC cable jacket or sheath materials. It shall not stress crack polyethylene per ASTM Standard 1693. There shall be no significant changes in the conductive properties of XLPE and EPR semi-conducting compounds when the lubricant's effect on volume resistivity is tested according to IEEE Standard 1210.
4. Lubricant to be specification-grade type that does not promote flame propagation when used with fire-retardant cables and systems, is harmless to humans, environmentally safe, and compatible with all common cable jacket materials
5. The lubricant shall contain no waxes, greases, silicones, or polyalkylene glycol oils or waxes. The lubricant shall have less than a 6.0% solids residue after drying for 24 hours at 105°C.
6. Where CPE insulated wire and/or cable is rated for Low Smoke / Zero Halogen type, only Polywater Type LZ shall be utilized.
7. Specific lubricants for fiber-optic and other special cable installations shall be determined by the cable / lubricant manufacturer and the CONTRACTOR shall provide submittal information, including MSDS documentation and other information verifying suitability of products and general specification compliance as outlined herein.
8. Acceptable Manufacturers:
 - a. PolyWater - DynaBlue
 - b. 3M - Type WL
 - c. Greenlee - Type GEL
 - d. Or approved Equal

B. Grounding Braid:

1. Provide conformable, all-metal (tinned copper wires), corrosion resistant, woven grounding braid having a high current-carrying capacity approximately that of 6 AWG wire, such as.
2. Manufacturers:
 - a. 3M, Scotch, Scotch® 25 Electrical Grounding Braid,
 - b. Plymouth
 - c. Permacel
 - d. Or approved equal.

C. Tapes:

1. Arc Proofing Tape:
 - a. Provide fire retardant arc proofing tape, such as Scotch® 77 Fire Retardant Electric Arc Proofing Tape, that is capable of protecting cables from fault arc

- generated heat and flames and of protecting adjacent wrapped cables and accessories exposed to fault arcs until limiting devices can interrupt the faulted circuit.
2. Vinyl Insulating Tape:
 - a. Provide UL-listed flexible polyvinyl chloride (PVC) backed insulating tape with a pressure sensitive adhesive, such as black Scotch® 33+ Vinyl Electrical Tape, that is resistant to abrasion, acids, alkalis, and copper corrosion; resistant to, hot, cold and wet weather; and resistant to damage from UV sunlight exposure.
 3. Rubber Splicing Tape:
 - a. Provide highly conformable, linerless, self-bonding, ethylene rubber (EPR), high-voltage (through 69 kV) insulating tape formulated to provide excellent thermal dissipation of splice heat, and designed to insulate splices and terminate cables whose overload temperatures can reach 130 degrees Celsius, such as Scotch® 130C Linerless Rubber Splicing Tape.
 4. Manufacturers:
 - a. 3M, Scotch
 - b. Plymouth
 - c. Permacel
 - d. Or approved equal.
- D. Tubing:
1. Heat Shrinkable Tubing:
 - a. Provide flexible, flame retardant, polyolefin heat shrinkable thin wall tubing that has good resistance to common fluids and solvents, and has a high dielectric strength.
 2. Waterproof Splice Kits:
 - a. Provide heat shrinkable thin wall polyolefin electrical cable splice kits.
 3. Manufacturers:
 - a. Tyco Electronics, CGPT
 - b. Thomas & Betts Corp.
 - c. Or Approved equal.
- E. Wire and Cable Connections:
1. Grounding Connectors:
 - a. Provide grounding connectors conforming to the requirements of Section 26 05 26 Grounding and Bonding for Electrical Systems.
 2. Connectors for Service Wires and Cables, and for Wires and Cables Larger Than Number 6:
 - a. Split Bolt Connectors or Compression Type Connectors:
 - 1) Provide UL-listed split bolt connectors or compression type connectors for making parallel or butt splices of stranded copper wire.
 - 2) Use companion preformed plastic insulating covers or tape insulation conforming to NFPA 70 (NEC) requirements.
 - b. Mechanical compression connectors:

- 1) Provide mechanical compression connectors that are capable of connecting single or multiple conductors, and of being installed with one wrench.
 - a) Type: Compact, two-hole mechanical compression connectors having two clamping bolts.
 - (1) Connector Body: Provide a high copper bronze or brass alloy body.
 - (2) Bolts: Provide brass or bronze bolts; plated steel screws are unacceptable.
 - (3) Fasteners: Provide silicon-bronze fasteners for bolting connectors to connections.
 - c. Crimped Compression Connectors:
 - 1) Provide two-hole crimped compression type connectors fabricated from high conductivity, seamless, electrolytic wrought copper, electrolytically tin-plated, and color coded to match the dies.
 - 2) Provide crimped compression type connectors with adequate area to conduct the electrical current.
 - 3) To crimp connectors, provide crimping tools from the same manufacturer that manufactured the connectors.
3. Control Wiring Connections:
 - a. For control wiring connections at terminal boards, provide crimped nylon-insulated ring terminals.
 - b. For control wiring splices, provide nylon insulated butt splices with insulation grips.
 - c. For joining more than two control wires, provide junction boxes with terminal boards.
4. Instrumentation Cable Connectors:
 - a. For connecting instrumentation cable and the equipment being furnished under this Contract, provide companion type connectors.
 - 1) For equipment controllers/enclosures that are furnished under other Sections of this Contract, furnish the connectors for connecting cable to the equipment with the equipment.
 - 2) Terminate the wiring as required for proper operation.
 - b. Manufacturers:
 - 1) Thomas & Betts Corp.
 - 2) AMP Inc.
 - 3) IlSCO Corp.
 - 4) Ideal Industries, Inc.
 - 5) Or Approved Equal
5. Connectors for Other Conductors:
 - a. Any of the applicable types listed for larger wire may be provided.
 - b. Screw Terminal Connections:
 - 1) For making terminal connections of stranded copper wire to screw terminals, provide nylon insulated crimped compression terminals with copper barrel on the wire.

- 2) For making terminal connections of solid copper wire to screw terminals, provide screw lock connectors.
- c. Wire Nuts:
 - 1) For making splices of copper wire, provide pre-insulated, UL-listed, solderless connectors of the spring-lock or compression type that can be installed by hand or using tools.
 - 2) For site lighting, wire nuts used in underground or below grade locations is prohibited. There only permitted use for site lighting is within a pole base.
- d. Manufacturers:
 - 1) Thomas & Betts Corp.
 - 2) Tyco Electronics, AMP Inc.
 - 3) IlSCO Corp.
 - 4) FCI-Burndy® Products
 - 5) Or approved equal.

2.04 SOURCE QUALITY CONTROL

- A. Tests:
 - 1. 600 Volt Rated Multi-Conductor Cable:
 - a. 70,000 BTU/hr Vertical Tray Flame Test:
 - 1) 600 Volt rated multi-conductor cable must pass the vertical tray flame test requirements of UL 1569, IEEE 383, and IEEE 1202.
 - b. 210,000 BTU/hr Vertical Tray Flame Test:
 - 1) 600 Volt rated multi-conductor cable must pass the vertical tray flame test requirements of ICEA T-29-520.
 - 2. Shielded Instrumentation Cable (2/C Cable):
 - a. Vertical Tray Flame Test:
 - 1) Shielded instrumentation cable must pass the vertical tray flame test requirements of UL 1685 with UL loading.

PART 3 EXECUTION

3.01 INSTALLERS

- A. Install the work of this Section only under the supervision of licensed electricians.

3.02 EXAMINATION

- A. Inspect all conduits, junction boxes, electrical vaults, and handholes to verify that they are clean, that they do not have burrs, that conduits are properly aligned, and that they are complete.
 - 1. Ensure that on all conduits without threaded hubs, two locknuts are installed.
 - 2. Ensure that in all conduits with wires larger than No. 10, bushings are installed.
 - 3. Ensure that grounding bushings and fittings are installed at all places specified in Section 26 05 26, Grounding and Bonding.
 - 4. Verify that proper sized boxes are installed.

- B. Verify that boxes and conduit fittings conform to the bending requirements specified in Article 314 of NFPA 70 (NEC).

3.03 PREPARATION

- A. Verify that pulling calculations have been made and are available for long conduit runs and pulls as indicated in this Section.
- B. Do not begin installing wiring until other work which might cause damage to the wires, cables, or conduits has been completed.
 - 1. Correct deficiencies in conduits, junction boxes, electrical vaults, and handholes that have been discovered by the inspection required in Paragraph 3.02.A.
- C. Prepare conduits to receive wire and cable.
 - 1. Swab the conduits with a nylon brush and steel mandrel.
 - 2. Pre-lubricate the conduits for which the pulling tension calculations are based on a coefficient of friction less than that of a dry conduit.
- D. Verify that a means of controlling the pulling tension on the wire or cable is installed on the mechanical assist devices furnished for pulling cable.
- E. Take the necessary precautions to prevent water, dirt, or other foreign material from accumulating in the conduits during the execution of wiring work.

3.04 INSTALLATION

- A. Low Voltage Ground, Power, and Control Wiring:
 - 1. Install Type CL2P, FPLP, or CMP cable as required by the application in accordance with the requirements of NFPA 70 (NEC).
 - a. For exposed low voltage wiring, use plenum cable.
 - b. For low voltage wiring concealed from view, only install wiring in the accessible locations permitted by the Contract Drawings.
 - 2. Neutral Conductors:
 - a. For each single-phase and each multi-phase feeder, provide separate neutrals.
 - b. For branch circuits, except at three-phase wye-connected panelboards, provide separate neutral conductors.
 - 1) For the three-phase wye-connected panelboards, provide common neutrals from 3 adjacent single-pole circuit breakers or from the poles of the same multi-pole circuit breaker.
 - c. Except for feeders with a small unbalanced and single-phase load, size each neutral the same as the largest phase conductor.
 - 1) For feeders with a small unbalanced and single-phase load, size the feeders to the largest of the following:
 - a) The size of any three-phase load connected to the neutral, which contains lighting, computer power outlets, instrumentation, or other electric loads.
 - b) The size required for 125 percent of the maximum unbalanced load.

3. Equipment Ground Conductors:
 - a. Provide a green equipment ground conductor with all runs.
 - 1) Provide the equipment ground conductor wire type as specified in Section 26 05 26, Grounding and Bonding.
- B. Special Cable Installation Requirements:
 1. In addition to the other installation requirements specified within this Section, comply with the manufacturer's installation instructions for bending, pulling, connector types, and grounding when installing armored variable frequency drive cable.
 - a. Submit the manufacturer's installation instructions for armored variable frequency drive cable.
- C. Pulling Cable:
 1. Establish a feed-in point at the manhole, handhole, or building located at the highest elevation of the run, and pull cables down grade using flexible cable feeds to convey the cables into the duct runs through the feed-in point opening.
 - a. Furnish quadrant blocks located properly along the cable run.
 - b. Limit cable pulling tensions to the maximum pulling tensions recommended by the cable manufacturer.
 - 1) Measure the cable pulling tension on all runs pulled with mechanical assistance and for all cable runs where calculations are required to be submitted by using a dynameter.
 - 2) Remove cables subjected to excessive bending and tension and that are cracked or have damaged or nicked outer jackets from the Site, and replace these cables with new undamaged cables.
 - a) If pulling tension is exceeding during pulling, remove the affected cables and mark them as not to be reused.
 - c. Lubricate cables with lubricants during pulling.
- D. Installing Cables in Manholes:
 1. Install cable along the manhole wall that provides the longest route and the maximum spare cable length.
 2. Form cables so they closely parallel the walls, and do not interfere with duct entrances.
 3. Support cable on brackets and insulators spaced at a maximum of 2 feet apart.
 4. Use pulling lubricants approved by the cable manufacturer.
- E. Terminating Cable:
 1. Terminate cable using materials and methods indicated or specified herein, or in accordance with the written instructions of the cable manufacturer or termination kit manufacturer.
 - a. For equipment connections, provide split bolt or compression type connectors, mechanical compression connectors, or crimped compression type connectors as specified and approved by the equipment manufacturer; for all other types of connections provide connectors of one of the types specified:

2. Protect insulated power and lighting cable terminations from accidental contact, deterioration of coverings, and moisture by using proper terminating devices and materials.

F. Splicing Wire and Cable:

1. All new conductors shall be continuous from end to end without splices, except where indicated on the drawings or with the special written permission of the ENGINEER on a case-by-case basis where the CONTRACTOR can demonstrate that installation without splices is not practical.
2. If permitted as noted above, splice cables in accessible locations.
3. Below-Grade Splices:
 - a. In underground systems, locate splices above the 100 year flood level.
 - b. Make below-grade splices using a compression connector on the conductor.
 - c. Insulate and waterproof below-grade splices by methods suitable for continuous submersion in water using either of the methods that follow:
 - 1) Gravity Pour Method:
 - a) Provide an approved commercial waterproof splice kit with the necessary materials and equipment, including a mold suitable for the cables to be spliced.
 - (1) When the mold is in place around the joined conductors, prepare and pour the resin mix into the mold.
 - 2) Cast-Type Splice Insulation:
 - a) Provide an approved commercial waterproof splice kit with the necessary materials and equipment, including a thermosetting epoxy resin insulating material applied by a gravity pour method or by a pressure injection method.
 - b) Fix cables in place until the splicing materials have completely set.
4. Within outlet or junction boxes, make wire and cable splices that conform to the requirements of NFPA 70 (NEC).
 - a. Install these outlet or junction boxes in accessible locations.

G. Wiring Identification:

1. Color code all feeder wires and cables as indicated in Table 26 05 19-1, Table 26 05 19-2 and/or Table 26 05 19-3.

Table 26 05 19-1 Feeder Wire and Cable Color Coding		
Phase	480Y/277 Volts	208Y/120 Volts
A	Brown	Black
B	Orange	Red
C	Yellow	Blue
Neutral	Gray or White with Yellow Tracer	White
Electrical Ground Conductor	Green	Green

Table 26 05 19-2 Feeder Wire and Cable Color Coding	
Phase	120/240 Volts Single-Phase
A	Black
B	Red
Neutral	White
Electrical Ground Conductor	Green

Table 26 05 19-3 Feeder Wire and Cable Color Coding	
Phase	240/120 Volts Three-Phase High Leg
A	Black
B	Red
C	Blue
Neutral	White
Electrical Ground Conductor	Green
High Leg	Add Orange tape to color indicated above

2. Identify all power wiring by circuit and panelboard, switchboard, and motor control center numbers.
3. Identify all control wiring with wire numbers.
4. Provide additional electrical identification of cabling and wiring as specified in Section 26 05 53, Identification for Electrical Systems.

H. Refer to Section 26 05 00 for requirements for measuring and recording of conductor lengths.

3.05 FIELD QUALITY CONTROL

A. Site Tests:

1. Prior to energizing wire and cable, field test the wire and cable as specified in Section 26 05 63 Acceptance Testing of Electrical Systems.

B. Inspection:

1. Record the actual installed elevations and locations of grounding cables and rods, both concealed and exposed, on the record drawings specified in Section 01780, Closeout Submittals.

C. Verify that the control wiring wire numbers correspond to the numbers indicated in the record drawings.

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Requirements for connecting, energizing, testing, cleaning, and protecting grounding and bonding systems.
- B. Related Sections:
 - 1. Section 01 33 00 – Submittal Procedures
 - 2. Section 26 05 00 – Common Work Results for Electrical.
 - 3. Section 26 05 63 – Acceptance Testing of Electrical Systems.
 - 4. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables
 - 5. Section 26 05 33.13 – Conduits for Electrical Systems.

1.02 REFERENCES

- A. Reference Standards:
 - 1. American Public Works Association (APWA):
 - a. APWA Public Works Management Practices Manual.
 - 2. American Society for Testing Materials (ASTM):
 - a. ASTM B 1; Standard Specification for Hard-Drawn Copper Wire.
 - b. ASTM B 3; Standard Specification for Soft-Drawn Copper Wire.
 - c. ASTM B 8; Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
 - d. ASTM C 653; Standard Guide for Determination of the Thermal Resistance of Low-Density Blanket-Type Mineral Fiber Insulation.
 - e. ASTM D 5; Standard Test Method for Penetration of Bituminous Materials.
 - f. ASTM D 149; Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies.
 - g. ASTM D 257; Standard Test Methods for D-C Resistance or Conductance of Insulating Materials.
 - h. ASTM D 570; Standard Test Method for Water Absorption of Plastics.
 - 3. InterNational Electrical Testing Association, Inc. (NETA):
 - a. ANSI/NETA ETT Standard for Certification of Electrical Testing Technicians.
 - 4. National Fire Protection Association (NFPA):
 - a. NFPA 70, National Electrical Code (NEC).
 - 5. National Electrical Manufacturing Association (NEMA):
 - a. NEMA TC-2; Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
 - b. NEMA TC-3; Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.

- c. NEMA TC-14; Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.
- d. NEMA WC-7; Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
- 6. Underwriter's Laboratories, Inc. (UL):
 - a. UL 467, Standard for Grounding and Bonding Equipment.
 - b. UL 486A-486B, Wire Connectors.
 - c. UL 486C, Standard for Splicing Wire Connections.
 - d. UL 486D, Standard for Insulated Wire Connector Systems for Underground Use or in Damp or Wet Locations.
 - e. UL 486E, Standard for Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors.

1.03 DESIGN REQUIREMENTS

- A. Design the electrical system installation to conform to Article 300 of NFPA 70, Wiring Methods, and to other applicable articles of NFPA 70 governing methods of wiring.
- B. Ground the conduit systems, metal enclosures, equipment frames, motors, and receptacles in accordance with Article 250 of NFPA 70, Grounding.
 - 1. Ground all metallic conduits, wiring channels, and armored cables continuously from outlet to outlet, and from outlets to cabinets, junction boxes, or pull boxes.
 - a. Bond each run of raceways to form a continuous path for ground faults from end to end.
 - b. When liquid tight flexible metal conduit sizes larger than 1-inch or flexible metal conduit are installed, provide external bond wires.
 - 2. Grounding Bushings:
 - a. Provide all 1-inch or larger metallic conduits with grounding bushings unless they enter metallic enclosures via integral threaded hubs.
 - b. Provide grounding bushings for conduits entering the bottom of freestanding equipment.
 - c. Bond wire from every grounding bushing to the equipment ground stud or ground bus in the enclosure.
 - d. Bond the grounding bushings to ground studs or ground buses in the enclosures.
 - 3. Provide insulated, internal equipment ground wire in all conduits.
 - a. Bond the internal wire to all pullboxes, junction boxes, equipment enclosures, and other enclosures as required by NFPA 70.
- C. Equipment Grounds:
 - 1. Design all feeders and branch circuits to include an equipment grounding conductor consisting of a copper wire within a raceway or cable and sized as specified herein.
 - a. Where conductors are run in parallel in multiple raceways, run the equipment grounding conductor in parallel to the related conductors.

- b. Size each of the parallel equipment grounding conductors on the basis of the ampere rating of the circuit overcurrent protecting device.
 - 2. Ground enclosing cases, mounting frames, rack mounted components, rack struts, switches, breakers, control panels, motors, and other electrical or electrically operated equipment by providing an equipment grounding conductor with phase conductors from an established equipment ground source.
- D. Ground Wire Sizes:
 - 1. The minimum size for bonding jumpers, equipment ground conductors, grounding electrode conductors, and ground grid conductors is as follows:
 - a. Under 600 volts:
 - 1) Provide #12 AWG, minimum.
 - 2) Control power circuits, Provide #14 AWG, minimum.
 - b. Over 600 volts:
 - 1) For transformers, provide #2 AWG ground wire, minimum.
 - 2) For motors, provide #4 AWG ground wire, minimum.
 - 2. When the ground wire size is not specified or indicated on the Contract Drawings, provide wire sized in accordance with the requirements of NFPA 70.
- E. Within 60 days of the Contract award, submit the following:
 - 1. The Submittals required by Section 26 05 00 – Common Work Results for Electrical.
 - a. Include Product Data and Catalog Cuts for all products provided, and describe the usage of each product.
 - 2. Shop Drawings for the ground well grid installation in unpaved areas.
 - 3. Shop Drawings for the ground well grid installation in paved areas.
 - 4. Shop Drawings for the ground bus installation.
- F. Project Record Documents:
 - 1. Prepare and submit record drawings showing the actual installed elevations and locations of grounding cables and rods for both concealed and exposed work provided under this Contract.
- G. Project Closeout:
 - 1. Submit Operation and Maintenance Manuals that include the record drawings and all Product Data in accordance with Section 01 78 00.

1.04 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Provisions and all Supplementary General Provisions.
 - 1. Product Data:
 - a. Manufacturer's product data
 - 2. Shop Drawings:
 - a. Ground well grid installation in unpaved areas.
 - b. Ground well grid installation in paved areas.
 - c. Ground bus installation.

3. Quality Assurance/Quality Control Submittals:
 - a. Certificates:
 - 1) Testing agency product certification
 - b. Qualification Statements:
 - 1) System installers' qualifications
 - 2) Installation supervisors' resumes
4. Closeout Submittals:
 - a. Operation and Maintenance Manuals

1.05 QUALITY ASSURANCE

- A. Qualifications:
 1. Installer Qualifications:
 - a. Employ installers who specialize in the work of this Section, and who can demonstrate a minimum of three years documented experience.
 - b. Submit the system installers' qualifications.
 2. Supervisor's Qualifications:
 - a. Employ supervisor to supervise the installation work who are skilled licensed electricians.
 - b. Submit the installation supervisors' resumes.
 3. All products are to be certified by Underwriters Laboratories, Inc. (UL),
- B. Regulatory Requirements:
 1. All grounding and bonding Work must comply with the requirements of NFPA 70, the National Electrical Code.
- C. Certifications:
 1. Testing Agency Product Certification:
 - a. Verify product quality by certifying products as meeting the requirements of one of the following:
 - 1) Underwriters Laboratories, Inc. (UL).
 - a) Provide products listed and labeled by UL.
 - b. Testing agency product certification must include agency listing and labeling, either by a printed mark on the data or by a separate listing card.
 - 1) If an item does not have this quality assurance verification, provide a written statement from the product manufacturer indicating why not; such manufacturer's statements are subject to the approval of the ENGINEER.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling, and Unloading:
 1. Transport materials, both on site and from CONTRACTOR's storage to site, in accordance with the recommendations of the respective manufacturers.
- B. Storage and Protection:

1. Store materials, both on and off site, in accordance with manufacturer's written instructions.
2. Store products indoors on blocking or pallets.

PART 2 PRODUCTS

2.01 MATERIALS

A. Conduit and Conduit Fittings:

1. For conduit and conduit fittings that enclose single ground wires without accompanying circuit conductors provide one of the following:
 - a. Schedule 80, non-metallic conduit and fittings conforming to the requirements of Section 26 05 33.13 and the conduit additionally conforming to the requirements of NEMA TC-2, and the fittings additionally conforming to the requirements of NEMA TC-3.
 - b. Fiberglass reinforced plastic (FRP) conduit and fittings conforming to the requirements of NEMA TC-14 and Section 26 05 33.13.
2. For other conduit and conduit fittings, provide conduit of the types specified or indicated and that conform to the requirements of Section 26 05 33.13.

B. Wire:

1. Bare Ground Wire:
 - a. Soft drawn copper, Class A or Class B stranded, meeting the requirements of ASTM B3 for sizes #6 or larger.
 - b. Soft drawn solid copper, meeting the requirements of ASTM B3 for sizes #8 or smaller.
2. Insulated Ground Wire:
 - a. Provide insulated Class B copper stranded wire rated for 600 volts that conforms to the requirements of NEMA WC-7, and is green in color. Insulation type shall be as specified in Section 26 05 19.
3. Acceptable Manufacturers:
 - a. Continental Wire & Cable Company www.continentalwire.com
 - b. SouthWire www.southwire.com
 - c. General Cable www.generalcable.com
 - d. Okonite Co. www.okonite.com
 - e. Or Approved Equal

C. Clamps and Non-Welded Connectors:

1. Provide bronze or brass clamps and connectors that are UL listed for use below grade.
 - a. All bolts and other material must be bronze or brass, plated steel screws are unacceptable.
 - b. Fabricate multi-bolt, solderless compression clamps from high strength electrical bronze, and provide silicon bronze clamping bolts and hardware.
2. Provide bolts, nuts, lock-washers, and similar hardware designed not to damage ground wire.
3. Acceptable manufacturers:

- a. IlSCO.
 - b. Framatone Connectors Inc. (FCI), Burndy.
 - c. Or Approved equal.
- D. Exothermic Welding Kits:
- 1. Provide molds, thermite packages, and other material for exothermic welds that are rated to carry 100 percent of the cable ratings, and which are letter-coded exothermic welded type.
 - 2. Provide all items such as tees, crosses, splices, and cable connections necessary for connecting ground and bonding cables to the following items:
 - a. Ground rods.
 - b. Reinforcing steel bars.
 - c. Ground-bus.
 - d. Structural steel.
 - e. Water pipe.
 - f. Bonding to the main-ground-grid.
 - g. Bonding to Copper Grounding Bus Bar
 - 3. Provide all exothermic welding molds, thermite packages, and other material used throughout the Work from a single manufacturer.
 - 4. Acceptable Manufacturers:
 - a. Erico, Cadweld®.
 - b. Continental Industries, Inc., Thermoweld®.
 - c. Or Approved equal.
- E. Ground Rods:
- 1. Provide UL listed, sectional ground rods fabricated using a electrolytic plating process to copper clad a medium carbon steel core
 - 2. Diameter: 3/4 inch.
 - 3. Length: 10 feet.
 - a. To obtain longer length rods, join rod sections using copper clad rod couplers.
 - 4. Acceptable Manufacturers:
 - a. Erico International Corp.
 - b. Galvan Industries, Inc.
 - c. South Atlantic, LLC
 - d. A.B. Chance Co.
 - e. Or Approved Equal
- F. Coating Compound:
- 1. Provide permanently pliable, moldable, un-backed, black rubber based coating materials for covering or coating grounding clamps and connectors.
 - 2. Coating Physical Properties:
 - a. Solids/Density: 100 percent; 12 pounds per gallon.
 - b. Penetration: Within 90 to 130 when tested in accordance with ASTM D 5.
 - c. Water Absorption: 0.10 percent, maximum, when tested in accordance with ASTM D 570.

- d. Dielectric Strength: 500 volts/mil when tested in accordance with ASTM D 149.
- e. Volume Resistivity: 2,000 megohm-inches, or 5,000 megohms-cm, when tested in accordance with ASTM D 257.
- f. Service Temperature: Minus 40 degrees to 160 degrees Fahrenheit; and having no melting point; flammability, or slow burning when tested in accordance with ASTM C 653.
- g. Chemical Resistance:
 - 1) Resistant to alcohol, water, aqueous hydrochloride, and sodium hydroxide.
 - 2) Dissolved by carbon tetrachloride, naphtha gasoline, mineral spirits, and benzene.
- h. Cohesive/Adhesive: Adheres to metals, concrete, and itself.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Site Verification of Conditions:
 - 1. The Contract Drawings are generally indicative of the Work, but due to their small scale, it is not possible to indicate some offsets and fittings required nor the minor structural obstructions that may be encountered.
 - a. Perform field measurements to discover offsets and fitting requirements not shown.
 - b. Locate all on-site utilities and other obstructions in the area of construction, and verify that interferences will not occur.

3.02 PREPARATION

- A. Layout electrical work to suit actual field conditions and in accordance with accepted standard practice.

3.03 INSTALLATION

- A. Construct each ground system and connection so it is mechanically secure and electrically continuous.
 - 1. Secure grounds to boxes in such a manner that each system is electrically continuous from the point of service to each outlet.
 - 2. Terminate conduits using double locknuts and bushings.
 - a. Unless a conduit run enters a metallic enclosure via integral threaded hubs, provide the conduit run with two locknuts.
 - 3. Clean paint, grease and such other insulating materials from the contact points of grounds.
- B. Ground Grids:
 - 1. Welding ground wires to the ground rods and equipment connections.
 - a. Follow the procedures of the exothermic welding kits manufacturer.

- b. Prior to welding ground wires to the ground rods and equipment connections perform the following:
 - 1) Clean the proposed welding area of combustible and flammable materials; and block access to personnel to protect them from harm; and provide a shield to prevent damage to other materials.
 - 2) Clean insulation from ground wire for a distance of 12 inches, and clean the exposed wire to a bright finish.
 - 3) Clean paint, grease, and other similar insulating materials from contact points.
 - 4) Inspect the molds for damage; and discard any faulty mold or any molds used over 40 times.
 - c. Exothermically weld the ground wires to the ground rods as shown on the Contract Drawings, including to ground rods at grid crossings, to ground rods at grid intersections on the sides of the ground grid, and at all equipment connections.
 - d. After completing the welding, replace the insulation removed from insulated wires, and coat connections and the area around connections with coating compound.
 - 1) Coating Thickness: 1/8-inch, minimum.
 - 2) Make sure the coating is free from pin-holes and holidays.
 - 2. Make all connections to electrical equipment and ground buses with compression, two-hole lugs and studs.
 - a. Clean paint, grease, and other similar insulating materials from the contact points for the ground lugs and studs.
 - b. Clean all wires to a bright finish prior to construction the connections.
 - C. Equipment Ground Buses:
 - 1. Whenever several pieces of equipment, other than service grounds, require external bond wires in an area, provide an equipment ground bus.
 - 2. Wherever 5 or more conduits enter a box or enclosure, provide an equipment ground bus.
 - a. Connect all equipment ground wires and conduit bond wires within the box or enclosure to a single ground stud or single common ground bus.
 - 3. Size ground buses to carry 100 percent of the rating or setting of the largest over current device in the circuit(s) ahead of the equipment, conduit, or other item, and as indicated on the Contract Drawings.
 - D. Equipment Grounds:
 - 1. Install equipment grounds in spaces accessible to authorized personnel only.
 - 2. Equipment Grounding Connectors:
 - a. Only use approved grounding connectors.
 - 1) Terminate grounds with closed lugs with star washers on both sides and a 1/4-20 bolt and nut, minimum; spade lugs are not allowed.
 - 2) For portable electrical equipment, provide electric cords having an equipment grounding conductor and a NEMA and UL approved cord cap.

- b. Do not install grounding lugs on flanges, mounting screws, or standoffs in switches, distribution boxes, or panels.
 - c. Cover or coat grounding clamps and connectors with coating compound.
- 3. Equipment Grounding Conductors:
 - a. Unless using multi-conductor cable, run equipment grounding conductors inside the same conduit or wiring channel enclosing the power conductors.
 - b. In multi-conductor cable, locate grounding conductor inside the sheath or cable.
 - c. Do not use a system neutral or a current carrying conductor as the equipment grounding conductor.
 - 1) Do not ground the electrical and electronic equipment neutral to chassis, racks, equipment ground conductor, or any non-current carrying conductor on the equipment.
- 4. Grounding Lighting Fixtures:
 - a. Provide the housing of each lighting fixture with a separate, factory-installed grounding device and ground conductor.
 - b. Use the factory-installed grounding device for connecting a separate grounding conductor meeting applicable grounding requirements of the NEC to the fixture.
 - 1) Provide a green covered grounding conductor of the same wire gauge as the two power feed wires.
 - 2) Provide a continuous ground for the fixture construction.
- 5. Grounding Motors:
 - a. Install equipment grounding wire within conduit supplying power to motor.
 - b. Install bonding connectors across the liquid tight flexible conduit supplying motors.
- 6. Grounding and Bonding Pumps:
 - a. Provide a bond from each pump to its motor using a conductor equal in size to the motor circuit equipment grounding conductors.
- 7. Grounding Transformers:
 - a. If a transformer is a separately derived system as defined in NFPA 70, provide a ground wire in both the primary and secondary conduits; and bond the ground wire and metallic conduits, if used, to the nearest effectively grounded metallic water pipe or nearest effectively grounded structural steel column.
 - b. Provide an additional bond between cold or hot water pipes and structural steel located near a transformer bond connection.
- 8. Grounding Isolated Ground Receptacles:
 - a. Ground the receptacle grounding terminal via an insulated equipment grounding conductor routed with the circuit conductors within the raceway.
 - 1) This grounding conductor may pass through one or more panelboards without being connected to the panelboard grounding terminal in order to terminate directly at an equipment grounding conductor terminal of the applicable separately derived system or service within the same building or structure.

- b. Use of isolated equipment grounding conductors does not remove the requirement for grounding the raceway system and outlet box.

3.04 REPAIR/RESTORATION

- A. Replace any finished exothermic welded splice connections that inspections find to be defective.

3.05 FIELD QUALITY CONTROL

- A. Site Testing:
 - 1. Prior to energizing any system, test the resistance to ground for the system in accordance with Section 26 05 63.
 - a. Perform a continuity test from all utilization and distribution equipment to the ground grid on a run-by-run basis.
- B. Inspection:
 - 1. Prior to completion of the Work of this Section, inspect the items provided for conformity to the Contract Drawings and Specifications.
 - a. Leave in-place "made grounds" open until they have been inspected and approved by the ENGINEER.
 - b. Clean the surfaces involved in "made grounds" before connecting the grounds, and finish the installation with touch up painting or another protective coating to prevent corrosion.
 - 2. Inspect finished exothermic welded connections for the following defects:
 - a. Conductors appear within the splice area.
 - b. Top of splice risers are below conductors.
 - c. Surfaces exhibiting more than 20 percent slag material.
 - d. Surfaces with over slag material that has flowed into conductors.
 - e. Mold blowouts.
 - f. Excessive porosity.
 - 1) Small pores less than 1/32 inch are permitted.

3.06 PROTECTION

- A. Protect finished insulated wires from being painted.
- B. Protect all ground grid wells from damage during paving and landscaping.
- C. Protect all ground grid installations and ground wires from damage during the work of other Sections.

END OF SECTION

April 2021

Brazos River Authority
De Cordova Bend Dam

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 26 05 28

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Requirements for furnishing, installing, cleaning, and protecting hanger and support systems for electrical wiring, conduit boxes, and equipment.

B. Related Section:

1. Section 01 33 00 – Submittal Procedures
2. Section 26 05 00 – Common Work Results for Electrical

1.02 REFERENCES

A. Reference Standards:

1. American Iron and Steel Institute (AISI):
 - a. AISI Standard Steels (Handbook).
2. American Society for Testing Materials (ASTM):
 - a. ASTM A 53/A 53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated - Welded and Seamless.
 - b. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - c. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - d. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi, Minimum Tensile Strength.
 - e. ASTM B 633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
 - f. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
3. National Electrical Manufacturers Association (NEMA):
 - a. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts maximum).
4. National Fire Protection Association (NFPA):
 - a. NFPA 70 - National Electrical Code (NEC).
 - b. NFPA 258 - Standard Research Test Method for Determining Smoke Generation of Solid Materials.
5. Society of Automotive Engineers International (SAE):
 - a. SAE J 429 - Mechanical and Material Requirements for Externally Threaded Fasteners.
6. The Society for Protective Coatings (SSPC):
 - a. SSPC Painting Manual.
 - b. SSPC-SP 2 - Hand Tool Cleaning.

- c. SSPC-Paint 15 - Paint Specification No. 15, Steel Joist Shop Paint, Type I, Red Oxide Paint, Type II, Asphalt Coating.
- d. SSPC-Paint 20 - Paint Specification No. 20, Zinc-Rich Primers (Type I, "Inorganic," and type II, "Organic").
- 7. Underwriters Laboratory, Inc. (UL):
 - a. UL 568 - Nonmetallic Cable Tray Systems.
 - b. UL 635 - Standard for Insulating Bushings.
 - c. UL 870 - Standard for Wireways, Auxiliary Gutters, and Associated Fittings.
 - d. UL 884 - Standard for Underfloor Raceways and Fittings.
 - e. UL 1479 - Standard for Fire Tests of Through-Penetration Firestops.
 - f. UL 2239 - Hardware for the Support of Conduit, Tubing, and Cable.
- 8. U. S. General Services Administration (GSA)
 - a. Federal Specifications:
 - 1) A-A-1922A - Shield, Expansion (Caulking Anchors, Single Lead).
 - 2) FF-S-107C(2) - Screws, Tapping and Drive.

1.03 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Provisions and all Supplementary General Provisions and Section 26 05 00, Basic Electrical Materials and Methods:
 - 1. Product Data:
 - a. Provide product data and catalog cuts for the products provided under this Section.
 - 2. Shop Drawings:
 - a. Provide Shop Drawings.
 - b. Provide Shop Drawings of hanging supports for conduit.
 - 3. Quality Assurance/Control Submittals:
 - a. Design Data:
 - 1) Provide structural calculations for the following items:
 - a) Equipment backboards and support structures not directly fastened to the walls.
 - b) Hanging supports for conduit.
 - 2) Detailed drawings of proposed departures from the original design.
 - b. Certificates:
 - 1) Testing Agency/Quality Verification:
 - a) With the product data for electrical hangers and supports, provide evidence of quality verification, listing, and labeling by the Electrical Testing Agency (ETA); either by a printed mark on the data, or by a separate listing card.
 - b) If an item does not have ETA quality assurance verification, provide a written quality assurance verification statement from the product manufacturer indicating why the item does not have the specified quality assurance verification.
 - (1) Such quality assurance verification statements are subject to approval by the ENGINEER.

- 2) Manufacturers' Certificate of Compliance.
- c. Qualification Statements:
 - 1) Manufacturers' qualifications.

1.04 QUALITY ASSURANCE

- A. Qualifications;
 - 1. Electrical Testing Agency (ETA) Qualifications:
 - a. Use the Electrical Testing Agency (ETA) qualified as specified in Section 26 05 00, Basic Electrical Materials and Methods.
 - 2. Manufacturers' Qualifications:
 - a. Provide electrical support framing made by manufacturers that have been manufacturing support framing for a minimum of 5 years, and who carefully controls their operations to ensure that excellent product engineering, quality, safety, and reliability are achieved.
 - b. Submit the manufacturer's qualifications to the ENGINEER.
- B. Certifications:
 - 1. Electrical Testing Laboratory (ETL) Certification:
 - a. Provide products that are listed and labeled by Underwriters Laboratory, Inc. (UL) or certified as meeting the standards of UL by the Electrical Testing Laboratory (ETL) unless products meeting the requirements of these testing laboratories are not readily available or unless standards do not exist for the products.
 - 2. Manufacturers Certificate of Compliance:
 - a. Submit a manufacturer's Certificate of Compliance certifying that both the galvanizing and the products meet the requirements of the ASTM standards.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Packaging, Shipping, Handling, and Unloading:
 - 1. Deliver, store, and handle the hangers and supports in accordance with Section 26 05 00 Common Work Results for Electrical, and as specified herein.
 - 2. Deliver material to Site in the original factory packaging.
- B. Storage and Protection:
 - 1. Shelter and store the components under cover, and supported off the ground and floors on blocking.

PART 2 PRODUCTS

2.01 MANUFACTURED UNITS

- A. Metal U-Channel Electrical Support Framing Systems and Fittings:
 - 1. Stainless Steel U-Channel Support Framing Systems:
 - a. Provide U-channel supports, fittings, threaded rod, and hardware fabricated from Type 316 stainless steel.

- b. Manufacturers:
 - 1) Unistrut Corporation, Unistrut® Metal Framing System, www.unistrut.com.
 - 2) Or Approved Equal
- B. Conduit Supports:
 - 1. Stainless Steel Type 316 Conduit Supports:
 - a. Provide one-hole style 316 stainless steel fasteners with pipe straps similar to those as manufactured by Calbrite.
 - b. Provide support devices consisting of threaded rods, channel supports, and conduit straps/fasteners.
 - 2. Manufacturers:
 - a. Calbrite.
 - b. Or Approved equal.
- C. Bolts, Nuts, and Washers:
 - 1. For bolts, nuts, and washers smaller than 1/4-inch trade size, provide 316 stainless steel fasteners complying with the requirements of ASTM A 325.
 - 2. For fastening galvanized components, provide galvanized bolts, nuts, and washers galvanized in accordance with the requirements of ASTM A 325.
- D. Anchors and Fasteners:
 - 1. Drive (Deep-Pitch) Screws:
 - a. Provide Type 316 stainless steel self-tapping type drive (deep-pitch) screws that comply with the requirements of FF-S-107C(2).
 - 2. Drilled-In Anchors and Fasteners:
 - a. Provide drilled-in anchors and fasteners that comply with the requirements of FF-S-107C(2).
 - b. Masonry Anchors:
 - 1) Provide masonry anchors designed to accept both machine bolts and threaded rods as fasteners.
 - a) Provide SAE J 429 Grade 2 machine bolt fasteners fabricated from AISI Type 316 stainless steel.
 - b) Provide nuts and washers conforming to the requirements of ASTM A 563.
 - 2) Provide masonry anchors consisting of an expansion shield and expander nut contained inside the shield.
 - a) Expander Nuts:
 - (1) Fabricate square expander nuts with their sides tapered inward from the bottom to the top.
 - (2) Design the expander nuts to simultaneously climb the bolt or rod thread and expand the shield as soon as the threaded expander nut reaches and bears against the shield bottom when being tightened.
 - b) Expansion Shields:

- (1) Provide expansion shield bodies consisting of four legs, the inside of each tapered toward the shield bottom, or nut end.
 - (2) The end of one leg shall be elongated and turned across shield bottom. Outer surface of shield body shall be ribbed for grip-action.
- 3) Masonry Anchor Material:
 - a) Provide die cast Zamac No. 3 zinc alloy having a 43,000 psi minimum tensile strength.
- 4) Manufacturers:
 - a) U.S.E. Diamond, Inc., FORWAY System, , www.mktfastening.com.
 - b) Or Approved Equal
- c. Concrete Anchors:
 - 1) Stainless Steel Anchor/Fastener:
 - a) Provide one-piece AISI Type 316 stainless steel studs (bolts) with integral expansion wedges, AISI Type 316 stainless steel nuts, and AISI Type 316 stainless steel washers.
 - b) Provide stainless steel anchor/fasteners complying with the physical requirements of FF-S-325 for Group II, Type 4, Class 1.
 - 2) Acceptable Manufacturers:
 - a) U.S.E. Diamond, Inc.; SUP-R-STUD, www.mktfastening.com.
 - b) Hilti Fastening Systems; KWIK-BOLT, hilti.com.
 - c) Molly Fastener Group; PARABOLT.
 - d) Phillips; RED HEAD Wedge-Anchor, www.phillipsfastener.com.
 - e) Or Approved Equal
3. Hammer drive-type explosive charge drive-type anchors and fastener systems are unacceptable.
4. Lead shields, plastic-inserts, fiber-inserts, and drilled-in plastic sleeve/nail drive systems are unacceptable.

2.02 ACCESSORIES

A. Wall Seals:

1. Provide a hydrostatic seal to fill the annular space between conduit and through structure openings.
2. Manufacturer:
 - a. PSI-ThunderLine/Link-Seal Corp., Link-Seal®, www.linkseal.com.
 - b. Or Approved Equal

2.03 FABRICATION

- ### A. Fit and shop assemble items in the largest sections practical for delivery to the Site.

2.04 FINISHES

A. Prime paint non-galvanized steel items.

1. Prepare surfaces to be primed in accordance with the requirements of SSPC-SP 2.
 - a. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

2. Prime Painting: Apply one coat of primer.
- B. Galvanizing items specified above as galvanized.
 1. Galvanize the items after fabrication in accordance with the requirements of ASTM A 123/A 123M.
 2. Provide a minimum galvanized coating of 1.25 ounces per square foot (380 grams per square meter).
- C. Touch-Up Primer:
 1. For un-galvanized metal surfaces: Provide primer complying with the requirements of SSPC-Paint 15 for Type I, Red Iron Oxide.
 2. For galvanized surfaces: Provide primer complying with the requirements of SSPC-Paint 20 for Type I, Inorganic Zinc-Rich Primer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Field Measurement:
 1. Although the Contract Drawings are generally indicative of the Work, take field measurements to verify actual conditions.
 - a. Due to the small scale of the Contract Drawings it is not possible to indicate all offsets, fittings, and apparatus required or the minor structural obstructions that may be encountered during the Work.
 2. Carefully investigate the structural and finish conditions, and other construction work, at the Site which may affect the work of this Section.

3.02 PREPARATION

- A. After carefully investigating structural and finish conditions and other in-place construction work, produce detailed Shop Drawings showing proposed departures from the original design due to field conditions or other causes.
 1. Layout the electrical work according to accepted standard electrical trade practice to suit actual field measurements.
 2. Arrange the electrical work to consider existing conditions and to preserve access to other equipment, rooms, areas, and similar features of the construction.
 3. Provide plan and profile views of duct banks, and show equipment backboards and support structures not directly fastened to the walls on the Shop Drawings.
 4. Indicate the location and details of conflicting utility construction and slopes on the Shop Drawings.
 5. Submit the Shop Drawings to the ENGINEER prior to performing the Work of this Section.
- B. Obtain roughing-in dimensions of electrically operated equipment, including equipment being installed by both electrical and other construction trades.
 1. Set conduit and boxes only after receiving approved dimensions and checking such equipment locations.

2. Arrange electrical Work accordingly and furnish such fittings and apparatus as required to accommodate such conditions and to preserve access to other equipment, rooms, areas, and similar spaces.

3.03 INSTALLATION

- A. Install electrical Work in conformance to the requirements of NFPA 70 for wiring methods general requirements, and to other applicable Articles of the NEC governing methods of wiring.
- B. Installing Anchors and Fasteners:
 1. For anchoring or fastening applications in masonry and hollow-core precast concrete structural elements, provide masonry anchors as specified herein.
 2. For anchoring or fastening applications in cast-in-place concrete and solid precast concrete structural elements, provide concrete anchors as specified herein.
 3. Threaded Bolts:
 - a. Draw threaded bolted connections up tight using 316 stainless steel lock washers to prevent the bolt or nut from loosening.
 4. Drilled-In Expansion Anchors:
 - a. Install expansion anchors in strict accordance with manufacturer's instructions and the following.
 - 1) Drill holes to the required diameter and depth in accordance with anchor manufacturer's instructions for the size of anchor being installed.
 - 2) Minimum Embedment:
 - a) Embed expansion anchors to four and one-half bolt diameters minimum unless otherwise indicated on the Contract Drawings.
 - C. Installation of U-Channel Support Framing Systems in accordance with Table 26 05 28-1 below:

Table 26 05 28-1 U-Channel Support Framing Selection		
Condition 1	Condition 2	Type
Aboveground	Outside vertical support within 6" of concrete	Stainless Steel
	Outside other locations	Stainless Steel
	Interior NEMA 4X	Stainless Steel

- D. Installing Conduit Supports:
 1. For exterior locations provide stainless steel conduit supports.
- E. Panelboard/Enclosure Feed Risers:
 1. Furnish and install cable supports in feeder risers as required by the underwriters.

- F. In areas designated as wet, NEMA 3, NEMA 3R, NEMA 4X, NEMA 12, or NEMA 13 as defined in NEMA 250; secure equipment and conduit to no fewer than two 7/8-inch minimum depth, stainless steel channels mounted vertically on the walls.

3.04 REPAIR/RESTORATION

- A. Coatings:
1. Repair damage to coatings.
 - a. Touch up damaged coating surfaces using the specified primer for primed steel surfaces, and using zinc-rich primer for galvanized steel surfaces.

3.05 FIELD QUALITY CONTROL

- A. Inspection:
1. Verify the adequacy of coatings.
 2. Inspect the items provided under this Section for adherence to the fabrication tolerances specified above, and correct any discrepancies:

3.06 PROTECTION

- A. Protect the items provided under this Section from damage during the work of other trades.

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 26 05 33.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Requirements for furnishing, installing, energizing, and testing conduit, tubing, and fittings for communication lines and electrical transmission, distribution, and service lines.

B. Related Section:

1. Section 01 33 00 – Submittal Procedures
2. Section 26 05 00 – Common Work Results for Electrical
3. Section 26 05 26 – Grounding and Bonding for Electrical
4. Section 26 05 28 – Hangers and Supports for Electrical Systems
5. Section 26 05 63 – Acceptance Testing of Electrical Systems

1.02 REFERENCES

A. Definitions:

1. Definitions for all items are as stated in NFPA 70, IEEE C2, and in other reference documents unless otherwise stated, specified, or noted.

B. Reference Standards:

1. American National Standards Institute (ANSI):
 - a. ANSI/ASME B1.20.1 - Pipe Threads, General Purpose (Inch).
 - b. ANSI C80.1 - Rigid Steel Conduit - Zinc-Coated (GCR).
 - c. ANSI C80.6 - Intermediate Metal Conduit - Zinc Coated (IMC).
2. American Society for Testing and Materials (ASTM):
 - a. ASTM A 568/A 568M - Standard Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold Rolled, General Requirements for.
3. National Fire Protection Association (NFPA):
 - a. NFPA 70 - National Electrical Code (NEC).
4. Underwriters Laboratory, Inc. (UL):
 5. ANSI/UL 6 - Standard for Rigid Metal Conduit.
 1. ANSI/UL 360 - Standard for Liquid-Tight Flexible Steel Conduit.
 2. ANSI/UL 498 - Standard for Safety for Attachment Plugs and Receptacles.
 3. ANSI/UL 514A - Metallic Outlet Boxes.
 4. ANSI/UL 797 - Electric Metallic Tubing - Steel.
 5. ANSI/UL 1242 - Standard for Electrical Intermediate Conduit – Steel
6. Institute of Electrical and Electronics Engineers (IEEE):
 - a. IEEE C2 - National Electrical Safety Code.

1.03 DESIGN REQUIREMENTS

A. Conduit Systems:

1. Provide conduit of the type and material shown in Table 26 05 33.13-1, and 26 05 33.13-2 for the application indicated, or as indicated on the Contract Drawings. Project is considered NEMA 4X.
2. Provide conduit fittings made of material identical to that of the conduit system with which they are used.

Table 26 05 33.13-1 Conduit System Selection				
Location	Condition 1	Condition 2	Conduit Type	Size (Minimum) ¹
Above-Ground	Outside	Exposed to weather NEMA 3R/4 Locations	PVC Coated Rigid Galvanized Steel or Rigid Aluminum Conduit	3/4 Inch
		NEMA 4X Locations	Rigid Galvanized Steel	3/4 Inch
		Covered or Protected from weather NEMA 3R/4 Locations	Rigid Galvanized Steel or Rigid Aluminum Conduit	3/4 Inch
1 No conduit smaller than 3/4-inch trade size is permitted unless indicated otherwise on the Contract Drawings.				

Table 26 05 33.13-2 Conduit System Selection				
Location	Condition 1	Condition 2	Conduit Type	Size (Minimum) ¹
Above-Ground	Inside NEMA 4X	Within 6-inches of floor	Rigid Galvanized Steel	3/4 Inch
		Concealed in Masonry Block Wall	Rigid Galvanized Steel, Intermediate Metal Conduit	
		Concealed in Cast-in-Place Concrete Wall or Floor	Rigid Galvanized Steel	3/4 Inch

Table 26 05 33.13-2 Conduit System Selection				
Location	Condition 1	Condition 2	Conduit Type	Size (Minimum)
		Recess Mounted Lighting Fixtures and Rotating or Vibrating Equipment	Liquid-Tight Flexible Metal Conduit	3/4 Inch
		Exposed	Rigid Galvanized Steel	3/4 Inch
		Recess Mounted Lighting Fixtures and Rotating or Vibrating Equipment	Liquid-Tight Flexible Metal Conduit	3/4 Inch
1 No conduit smaller than 3/4-inch trade size is permitted unless indicated otherwise on the Contract Drawings.				

1.04 SUBMITTALS

A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Provisions and all Supplementary General Provisions.

1. Product Data:

- a. Intermediate Metal Conduit (IMC).
- b. Liquidtight flexible metal conduit.
- c. Rigid galvanized steel conduit (RGS).
- d. Fittings for metallic conduit systems.
- e. Conduit spacers.
- f. Heat shrink tubing.
- g. Wall and floor penetration seals.
- h. Cold galvanize coating.

2. Shop Drawings:

- a. Proposed departures from the original design.

3. Quality Assurance/Control Submittals:

- a. Qualification Statements:
 - 1) Qualifications of the installer.
 - 2) Qualifications of the Electrical Testing Laboratory (ETL).
- b. Certificates:
 - 1) Testing agency/quality verification, listing, and labeling.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications:

- a. Employ an installation firm with a minimum of three years documented experience installing conduit and tubing similar in type and scope to that required by this Contract to install the Work of this Section.
- b. Employ skilled licensed electricians to supervise the Work of this Section.

- c. Submit information verifying the installer's qualifications.
- 2. Electrical Testing Laboratory (ETL) Qualifications:
 - a. Employ an independent testing agency, qualified as specified in Section 26 05 00 Common Work Results for Electrical, to perform the testing required by this Section.
 - b. Submit information verifying the ETL's qualifications.
- B. Regulatory Requirements:
 - 1. Perform the Work of this Section in accordance with the requirements specified in NFPA 70 (NEC), and to other applicable state, local, and national governing codes and regulatory requirements.
 - 2. All items installed from utility service poles to the main service panels must be approved by the serving utility, whether electrical service or telephone service, as listed in Section 26 05 00 Common Work Results for Electrical.
- C. Certifications:
 - 1. Provide products that are listed and labeled by Underwriters Laboratory, approved by Factory Mutual, or certified as meeting the standards of UL by the Electrical Testing Laboratory (ETL) for the location the product is installed in, and the application intended, unless products meeting the requirements of these nationally recognized testing laboratories are not available or unless standards do not exist for the products.
 - a. Submit evidence with the Product Data that the products represented meet testing agency quality verification requirements, including agency listing and labeling requirements.
 - 1) Such evidence may consist of either a printed mark on the data or a separate listing card.
 - b. Submit a written statement from those product manufacturers that do not provide evidence of the quality of their products that indicates why an item does not have a quality assurance verification.
 - 1) Such statements provided in lieu of quality assurance verification are subject to the acceptance of the ENGINEER.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling, and Unloading:
 - 1. Pack, ship, handle, and unload products in accordance with the requirements of Section 26 05 00 Common Work Results for Electrical, and as detailed herein.
- B. Acceptance at Site:
 - 1. Acceptance products at the Site in accordance with the requirements of Section 26 05 00 Common Work Results for Electrical, and as detailed herein.
- C. Storage and Protection:
 - 1. Store products in accordance with the requirements of Section 26 05 00 Common Work Results for Electrical, and as detailed herein.
 - a. Store all products indoors on blocking or pallets.

PART 2 PRODUCTS

2.01 METALLIC CONDUIT

A. Intermediate Metal Conduit (IMC):

1. Provide intermediate metal conduit (IMC) conforming to the requirements of Article 342 in NFPA 70 (NEC) for materials and uses, ANSI C80.6 and UL 1242.
2. Fabricate intermediate metal conduit (IMC) from high strength low alloy sheet steel meeting the requirements for ASTM A 568 piping, galvanized inside and outside, and protected against corrosion by a dichromate rinse or a zinc chromate coating.
3. Provide conduit furnished in 10-foot minimum lengths with both ends threaded and one end fitted with a coupling.
4. Manufacturers:
 - a. Tyco/Allied Tube and Conduit, www.alliedtube.com.
 - b. Wheatland Tube Company, Division of John Maneely Company, www.wheatland.com.
 - c. Or Approved equal.

B. Liquidtight Flexible Metal Conduit:

1. Provide PVC coated flexible metal conduit conforming to the requirements of Article 350 of NFPA 70 (NEC) for materials and uses and ANSI/UL 360.
2. Provide conduit with interlocking spiral strip construction capable of bending to a minimum radius of five times its diameter without deforming the spiral strips both inside and outside of the conduit.
 - a. Provide conduit with a flexible, galvanized, interlocking spiral strip steel core jacketed with smooth, liquid-tight polyvinyl chloride designed to withstand temperatures from minus 40 degrees Celsius to plus 60 degrees Celsius.
3. Finish the interior and exterior of flexible conduit smooth and free from burrs, sharp edges, and other defects that may injure wires; and place the manufacturer's trademark on each length.
4. Furnish an integral continuous copper ground in 1/2-inch through 1-1/4-inch PVC coated flexible metal conduit.
5. Acceptable Manufacturers
 - a. Electri-Flex Company, Liquatite®, Type LA, www.electriflex.com.
 - b. ANAMET Electrical, Inc., Anaconda Sealtite®, www.anacondasealtite.com.
 - c. Or Approved equal.

C. Rigid Galvanized Steel Conduit (RGS):

1. Provide rigid galvanized steel conduit (RGS) conforming to the requirements of Article 344 of NFPA 70 (NEC) for materials and uses, ANSI C80.1, and UL 6.
2. Fabricate the RGS from mild steel piping, galvanized or sherardized inside and outside, and protected against corrosion by a dichromate rinse or a zinc chromate coating.
3. Provide defect free conduit bearing the UL label, and furnished in 10-foot minimum lengths with both ends threaded and one end fitted with a coupling.
 - a. Provide tapered NTP 3/4 inch per foot threads complying with ANSI/ASME B1.20.1.

4. Acceptable Manufacturers:
 - a. Tyco/Allied Tube and Conduit, www.alliedtube.com.
 - b. Wheatland Tube Company, Division of John Maneely Company, www.wheatland.com.
 - c. Or Approved equal.

2.02 CONDUIT FITTINGS

- A. Fittings for Threaded Metallic Conduit Systems:
 1. Construct conduit bodies/fittings from cast malleable iron or cast steel.
 2. Conduit Outlet Bodies:
 - a. Provide malleable iron threaded entry type conduit outlet bodies with neoprene gaskets and cast steel cover.
 - b. Acceptable Manufacturers:
 - 1) EGS/Appleton Electric, www.appletonelec.com.
 - 2) EGS/O-Z/Gedney, www.o-zgedney.com.
 - 3) Or Approved equal.
 3. Conduit Expansion Joints:
 - a. Provide telescoping sleeve type galvanized, weatherproof, and vapor tight conduit expansion joints designed for 4-inch maximum expansion with an insulated bushing and lead-wool packing.
 - b. Acceptable Manufacturers:
 - 1) EGS/Appleton Electric, www.appletonelec.com.
 - 2) EGS/O-Z/Gedney, www.o-zgedney.com.
 - 3) Or Approved equal.
 4. Conduit Unions:
 - a. Provide conduit unions capable of completing a conduit run when neither conduit end can be turned.
 - b. Acceptable Manufacturers:
 - 1) EGS/Appleton Electric, UNF and UNY Unions, www.appletonelec.com.
 - 2) Thomas and Betts Company, Erickson® Coupling., www.tnb.com/contractor/docs/tbhazardous.pdf
 - 3) Or Approved equal.
 5. Conduit Outlet Boxes:
 - a. Provide malleable or cast iron conduit outlet boxes conforming to the requirements of UL 886, and having a cover with O-rings to keep out moisture.
 - b. Acceptable Manufacturers:
 - 1) EGS/Appleton Electric, GRF outlets and covers, www.appletonelec.com.
 - 2) EGS/O-Z Gedney, www.o-zgedney.com.
 - 3) Or Approved equal.
 6. Conduit Device Boxes:
 - a. Provide malleable iron conduit device boxes with internal grounding screws and conforming to the requirements of UL 498 and UL 514A.
 - b. Acceptable Manufacturers:
 - 1) EGS/Appleton Electric, FD device boxes, www.appletonelec.com.

- 2) EGS/O-Z Gedney, www.o-zgedney.com.
 - 3) Or Approved equal.
7. Conduit Sealing Fittings:
 - a. Provide, triple coated, malleable iron conduit sealing fittings.
 - 1) Coat the conduit sealing fittings with zinc electroplate, dichromate, and an epoxy powder coat.
 - b. Provide drain fittings in conduit sealing fittings where required.
 - c. Provide sealing covers for junction boxes where required.
 - d. Acceptable Manufacturers:
 - 1) EGS/Appleton Electric, www.appletonelec.com.
 - a) Sealing hubs: ES.
 - b) Sealing fittings: EY, EYS, EYSF, EYSM, EUS, EYD, EYDM
 - 2) EGS/O-Z Gedney, www.o-zgedney.com.
 - 3) Or Approved equal.

2.03 CONDUIT SPACERS

- A. Provide non-metallic, interlocking type conduit spacers which snap together to join any combination of intermediate and base units together, both vertically and horizontally.
- B. Manufacturers:
 1. Underground Devices Inc., www.udevices.com.
 2. The George-Ingraham Corp.
 3. Or Approved equal.

2.04 HEAT SHRINK TUBING

- A. Provide all-weather corrosion resistant vinyl plastic heat shrink tubing designed for application on the exterior of metallic conduit to protect against galvanic action, moisture or other deteriorating contaminants.
- B. Manufacturers:
 1. Tyco Electronics, Raychem, www.raychem.com.
 2. Thomas & Betts
 3. Or Approved equal.

2.05 WALL AND FLOOR PENETRATION SEALS

- A. Provide watertight mechanical seals capable of holding up to 20 psig, and sealing against water, soil, and backfill material.
- B. Acceptable Manufacturers:
 1. Pipeline Seal & Insulator, Inc., Thunderline/Link-Seal, www.linkseal.com.
 2. Flexicraft Industries, PipeSeal, <http://flexicraft.com>.
 3. Or Approved equal.

2.06 FINISHES

A. Cold Galvanize Coating:

1. Provide a cold galvanize coating to provide protection against corrosion by forming an insoluble zinc salt barrier from a cathodic reaction when the coating is damaged by abrasion and exposed to weather.
 - a. Provide a single component pre-mixed liquid organic zinc compound producing 95 percent zinc in the dry film.
 - b. Provide a coating that bonds to clean iron, steel, or aluminum through electrochemical action.
2. Acceptable Manufacturers:
 - a. ZRC. Worldwide, www.zrcworldwide.com.
 - b. Clearco
 - c. Krylon
 - d. Rustoleum
 - e. Or Approved Equal

PART 3 EXECUTION

3.01 EXAMINATION

- A. Although the Contract Drawings are generally indicative of the Work, take field measurements to verify actual conditions.
 1. Due to the small scale of the Contract Drawings it is not possible to indicate all offsets, fittings, and apparatus required or the minor structural obstructions that may be encountered during the Work.
- B. Inspect the condition of existing conduit that is required for the Work of this Section.

3.02 PREPARATION

- A. After carefully investigating structural and finish conditions and other in-place construction work, prepare and submit detailed Shop Drawings showing proposed departures from the original design due to field conditions or other causes.
 1. Layout the electrical work according to accepted standard electrical trade practice to suit actual field measurements.
 2. Arrange the electrical work to consider existing conditions and to preserve access to other equipment, rooms, areas, and similar features of the construction.
 3. Include plan and profile views of duct banks.
 4. Indicate the location and details of conflicting utility construction and slopes.
 5. Submit these Shop Drawings to the ENGINEER prior to performing the Work of this Section.
- B. Submit Product Data and catalog cuts for all products provided under this Section.
 1. Clearly indicate the usage of each product on the submittal.
- C. Obtain roughing-in dimensions of electrically operated equipment, including equipment being installed by both electrical and other construction trades.

1. Set conduit and boxes only after receiving approved dimensions and checking such equipment locations.
- D. Remove dirt, debris, and other obstructions from existing conduit required for the Work of this Section by blowing out and mandreling the conduits as applicable.

3.03 INSTALLATION

- A. Perform the Work of this Section as specified in Section 26 05 00, Common Work Results for Electrical.
- B. Fabricate and install conduit and wireway systems in accordance with accepted electrical trade standard practice.
 1. Layout the electrical work of this Section to suit actual field measurements.
 - a. Record the actual installed elevations and locations of duct banks and the as-found locations of conflicting utility lines on the record drawings specified in Section 01780, Closeout Submittals, and submit the record drawings.
 2. Install the electrical Work of this Section in conformance to the wiring methods general requirements of Article 300 in NFPA 70 (NEC), and to all other applicable Articles of NFPA 70 governing wiring methods.
 3. Cut conduit and wireway square, and ream the cut ends according to the requirements of NFPA 70 (NEC) to deburr the openings so that they are not restricted more than cuts made by the material manufacturer.
 4. Avoid bending conduits as much as possible and practical; but if bends are made, use an approved conduit bending tool or machine to make the bends.
 5. Do not install crushed or deformed conduit, and remove crushed or deformed conduit from the Site.
 6. On conduit that is installed outside, provide a second equipment ground conductor and use fittings with a built-in ground lug for bonding.
 7. Provide flexible conduit only to the extent permitted by NFPA 70 (NEC).
 - a. In flexible conduits that do not have an integral ground wire, install a green insulated wire in addition to the neutral wire for grounding purposes.
 - 1) Form a 'J' or 'S' hook with a drip loop to allow flexibility.
 - 2) Provide a second equipment grounding conductor on outside conduit and provide fittings with built-in ground lug for bonding.
 - b. In exposed areas, use RGS conduit and fittings.
 - c. Use flexible metal conduit or liquid tight flexible metal conduit for final connection to recessed lighting fixtures and rotating and vibrating equipment.
 - 1) Flexible Metal Conduit is only permitted for final connections to lighting fixtures in dry, environmentally conditioned spaces.
 - 2) Liquid tight flexible metal conduit, as herein specified, for final connection to recess mounted lighting fixtures in unconditioned spaces and to all rotating and vibrating equipment including transformers, motors, solenoid valves, pressure switches, limit switches, generators, engine-mounted devices and pipe-mounted devices.

- 3) Flexible conduit not to exceed 18 inches in length for motor connections, 36 inches in length for equipment connections or 72-inches for lighting fixture connections.
 8. Provide fittings and apparatus as required to construct the approved electrical design.
 - a. Running threads on conduit are not permitted.
 - 1) Where couplings and connectors are required for metal conduits, use approved threaded couplings and connectors.
 - b. Provide conduit unions where necessary to complete a conduit run when neither conduit end can be turned.
 - c. Where conduit and raceway runs cross building expansion joints, make provision for expansion in the conduit and raceway runs.
 - d. Provide sealing fittings with drain fittings in all lower runs and vertical runs.
 - e. Provide sealing covers for junction boxes where required.
 - f. Provide weatherproof conduit hubs on all conduit connections exterior to the building, and on instruments, process equipment, and pump motors.
 9. Installing RGS Conduit:
 - a. Installation of the RGS Conduit System shall be performed in accordance with the Manufacturer's recommendations.
 - b. Threading Conduit:
 - 1) Field thread the conduits per the manufacturers instructions.
 - a) Do not damage or remove the coating beyond the proposed end of the threads.
 - 2) Once the threading operation is complete, protect the newly cut threads against corrosion by applying a "sealing" compound as recommended by the manufacturer.
 - c. Assembling RGS Conduit Fittings:
 - 1) Just prior to assembling each conduit joint, apply the conduit manufacturer's touch-up compound to the end of the conduit in the area normally covered by the fitting sleeve.
 - 2) Use cloth or other material over strap type wrenches to protect the coating while tightening conduits.
 10. Breathers and drains shall be provided at the low point(s) of all conduit runs in NEMA 3R, 4, 4X and 7 areas, and where otherwise subject to the accumulation of condensation. Conduits shall be arranged to drain away from dry areas toward damp or wet areas, and away from equipment and enclosures.
- C. Exposed Work:
1. In exposed work, run conduit and raceway parallel to centerlines and structure surfaces; or perpendicular to centerlines where required, with right angle turns consisting of symmetrical bends or fittings.
 2. Maintain at least 6 inches clearance between conduit and raceway runs and pipes, ducts, and flues of mechanical systems.
 3. If a portion of a metallic conduit run, whether plastic-coated or not, extends above grade or is otherwise exposed to personnel, ensure that the conduit is properly bonded to an equipment grounding conductor at both ends.
 - a. Install the equipment grounding conductor either inside or outside the box.

D. Concealed Work:

1. When performing electrical work in concealed spaces, provide the same quality workmanship as in exposed work.
2. Conceal conduits and raceways in the structure's construction where practicable unless otherwise indicated on the Contract Drawings or required by the ENGINEER.
 - a. Group conduit and raceway runs in concealed work as much as practical to avoid congesting the concealed spaces.
 - b. Do not weaken the structure by excessive or unnecessary cutting.
 - 1) Only make cuts into the structure's construction in conformance to the applicable building codes.

E. Hangers and Supports:

1. Install auxiliary support structures, anchors, and fasteners as specified in Section 26 05 28, Hangers and Supports for Electrical Systems.
 - a. Mount or suspend conduit and wireway systems directly on structural members of the structures and walls.
 - b. Do not attach conduit or raceway systems to suspended ceiling members or to the suspending mediums.
 - c. Securely attach anchors into walls.
2. At all conduit attachments, allow space between the mounting surfaces and the conduit by providing U-channel supports, clamp-backs, or spacers.
 - a. Attach wall-mounted conduit runs close to the walls following the contour of the walls, parallel to the walls and other building lines except at bends.

F. Structure Penetrations:

1. Make penetrations in existing concrete structures by core-drilling.
 - a. Drill the penetrations true, clean, and free from spalling.
2. Install a wall penetration seal at all wall penetrations.
 - a. Size wall penetrations to accommodate the conduit outside diameter plus either 1/4 inch or a hole allowance to allow the installation of the wall penetration seal.
3. For conduits that enter rooms from concrete floors, provide corrosion protection by using an RGS conduit that extends from 12 inches inside the concrete or masonry to at least 6 inches into the room.

G. Wiring:

1. Install wiring in conduit as indicated.
2. Prior to the installation of any wire, verify that the conduit is clean and free of debris.
3. Install a separate ground conductor within every conduit.

3.04 FIELD QUALITY CONTROL**A. Inspection:**

1. Inspect installed conduit runs for obstructions, proper support, proper grounding, and completeness.

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De Cordova Bend Dam

2. Record the actual installed elevations and locations of conduit and tubing on record drawings.

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 26 05 33.23
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Requirements for furnishing, installing, connecting, cleaning, and protecting electrical pull and junction boxes.

B. Related Sections:

1. Section 01 33 00 – Submittal Procedures
2. Section 26 05 00 – Common Work Results for Electrical.
3. Section 26 05 26 – Grounding and Bonding Electrical Systems.
4. Section 26 05 28 – Hangers and Supports for Electrical Systems.
5. Section 26 05 63 – Acceptance Testing of Electrical Systems.
6. Section 26 05 33.13 – Conduits for Electrical Systems.

1.02 REFERENCES

A. Reference Standards:

1. National Electric Manufacturer's Association (NEMA):
 - a. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable.
 - c. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
2. National Fire Protection Association (NFPA):
 - a. NFPA 70 - National Electrical Code (NEC).
3. American National Standards Institute (ANSI):
 - a. ANSI Z55.1 - Gray Finishes for Industrial Apparatus & Equipment (*withdrawn 1990, no replacement*).

1.03 DESIGN REQUIREMENTS

A. Product Data:

1. Submit a list of the materials proposed to satisfy the requirements of this Section.
2. Submit the manufacturer's comprehensive calculations used to determine size requirements for the boxes.
3. Submit Product Data and catalog cuts of the materials and equipment proposed to be used to satisfy the requirements of this Section.

1.04 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Provisions and all Supplementary General Provisions.

1. Product Data:
 - a. List of the proposed materials.
 - b. Catalog cuts of steel outlet boxes for general purpose applications used with steel conduit systems.
 - c. Catalog cuts of cast outlet boxes for general purpose applications used with steel conduit systems.
 - d. Catalog cuts of cast outlet boxes for general purpose applications used with coated conduit systems.
 - e. Catalog cuts of sheet metal boxes for general purpose applications in dry locations.
 - f. Catalog cuts of equipment and control device enclosures for all areas except outdoor and corrosive locations.
 - g. Catalog cuts of equipment and control device enclosures for outdoor locations.
 - h. Catalog cuts of equipment and control device enclosures for corrosive locations.
2. Quality Assurance/Control Submittals:
 - a. Design Data.
 - 1) Manufacturer's comprehensive calculations.
 - b. Test Reports.
 - 1) Factory test reports.
 - c. Certificates.
 - 1) Testing agency/quality verification, listing, and labeling.
 - d. Qualification Statements.
 - 1) Qualifications of the licensed electricians.
 - 2) Qualifications of the Electrical Testing Laboratory (ETL).

1.05 QUALITY ASSURANCE

- A. Qualifications:
 1. Installer Qualifications:
 - a. To supervise installation of the Work of this Section, employ licensed electricians.
 - 1) Submit the qualifications of the licensed electricians supervising the Work of this Section.
 2. Electrical Testing Laboratory (ETL) Qualifications:
 - a. Employ an independent testing agency, qualified as specified in Section 26 05 63, Electrical Testing, to perform testing required by this Section.
 - b. Submit information verifying the ETL's qualifications.
- B. Regulatory Requirements:
 1. Perform the Work of this Section in accordance with the requirements specified in Articles 250, 300, and 370 of NFPA 70 (NEC), and to all other applicable state, local, and national governing codes and regulatory requirements.
- C. Certifications:

1. Provide products that are listed and labeled by Underwriters Laboratory, approved by Factory Mutual, or certified as meeting the standards of UL by the Electrical Testing Laboratory (ETL) for the location installed in, and listed and labeled or approved for the application intended as indicated or specified, unless products meeting the requirements of these testing laboratories are not readily available or unless standards do not exist for the products.
 - a. Provide products that are approved, listed, and labeled for the short circuit currents, voltages, and currents indicated or specified to be applied.
 - b. Provide service entrance labeled products for all service entrance equipment.
2. Submit evidence of testing agency/quality verification, listing, and labeling for each product with the submitted product data, either by providing a printed mark on the data or by attaching a separate listing card.
 - a. For items without such evidence, submit a written statement from the product manufacturer that indicates why it does not have quality assurance verification.

1.06 MATERIAL DELIVERY, STORAGE, AND HANDLING

- A. Packing, Shipping, Handling, and Unloading:
 1. Pack, ship, handle, and unload products in accordance with the requirements of Section 26 05 00, Common Work Results for Electrical.
- B. Acceptance at Site:
 1. Accept products at the Site in accordance with the requirements of Section 26 05 00, Common Work Results for Electrical.
- C. Storage and Protection:
 1. Store products in accordance with the requirements of Section 26 05 00, Common Work Results for Electrical.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Use of Trade Names:
 1. The use of trade names within the Contract Documents is intended to establish the basis of design and to illustrate the constructability and level of quality required.
 2. The use of trade names is not intended to exclude other manufacturers whose products are equivalent to those named, subject to compliance with Contract requirements.

2.02 MANUFACTURED UNITS

- A. Steel Outlet and Device Boxes for General Purpose Applications:
 1. For general purpose applications in dry, flush (in-wall) locations only, provide UL Listed galvanized steel outlet and device boxes conforming to NEMA OS 1.
 - a. Boxes shall be fabricated from steel not less than 0.062" thickness.

- b. Boxes shall have standard trade size knockouts to facilitate conduit and cable connector attachments.
 - c. Boxes shall be equipped with one 10-32 tapped hole for ground wire attachment.
- 2. Ceiling fan and light fixture bar hangers shall be UL Listed for 35 pound fan and 50 pound fixture.
- 3. Manufacturers:
 - a. Appleton Electric
 - b. O-Z/Gedney
 - c. Crouse Hinds
 - d. Thomas & Betts
 - e. Or Approved Equal

B. Cast Outlet Boxes for General Purpose Applications:

- 1. For Use with Steel Conduit Systems:
 - a. For use with steel conduit systems, provide UL Listed small cast steel or cast malleable iron outlet boxes with threaded hubs that meet the NEMA 250 requirements for Type 12 enclosures.
 - b. If covers are indicated or specified, provide cast steel or cast malleable iron covers with neoprene gaskets.
 - 1) Provide captive Type 316 stainless steel mounting screws for the covers.
 - c. If fixture hangers are indicated or specified, provide stainless steel fixture hangers with neoprene gaskets.
 - 1) Provide captive Type 316 stainless steel mounting screws for the fixture hangers.
 - d. Finish:
 - 1) Provide outlet boxes, covers, and hangers with an electroplated zinc coating, followed first by a dichromatic prime, and then by an aluminum polymer finish coating conforming to NEMA FB 1.
 - e. Manufacturers:
 - 1) Appleton Electric
 - 2) O-Z/Gedney
 - 3) Crouse Hinds
 - 4) Thomas & Betts
 - 5) Killark
 - 6) Or Approved equal.

C. Equipment and Control Device Enclosures:

- 1. For corrosive locations, provide enclosures that meet the NEMA 250 requirements for Type 4X enclosures, and as follows:
 - a. Enclosure Cabinet:
 - 1) For wall mounted enclosures, fabricate enclosure bodies from 14-gauge Type 316; and having continuously welded seams, ground smooth.
 - 2) For floor mounted enclosures, fabricate enclosure bodies from 12-gauge Type 316 stainless steel sheets and enclosure backs from 10-gauge Type 316 stainless steel sheets; and having continuously welded seams, ground smooth.

- a) Provide stainless steel floor stands, if required.
 - b) Provide stainless steel lifting eyes.
 - 3) Provide a grounding stud on the enclosure body.
 - 4) Provide enclosures having no holes or knockouts.
 - b. Enclosure Doors:
 - 1) For wall mounted enclosures, provide a removable hinged door fabricated from 14-gauge Type 316 stainless steel sheets; and having a rolled lip on three sides and a continuous stainless-steel hinge with a removable hinge pin on the fourth side.
 - a) Provide a stainless-steel door clamp assembly that assures a watertight seal.
 - 2) For floor mounted enclosures, provide either doors similar to those specified for wall mounted enclosures, or 14-gauge Type 316 stainless-steel sheets hinged doors with concealed die-cast hinges that allow 180 degree door opening and easy door removal.
 - 3) Provide a means of bonding on the door.
 - c. Door Gasket:
 - 1) Provide a seamless, foam-in-place, oil-resistant door gasket for each enclosure.
 - d. Security:
 - 1) Provide a mechanism for padlocking the enclosure.
 - e. Finish:
 - 1) Provide enclosures with unpainted, Number 4 brushed finish surfaces.
 - f. Manufacturers:
 - 1) Pentair, Type 4X Enclosures and General Purpose Two-Door Floor-Mount Type 4X Enclosures
 - 2) Rittal Corp
 - 3) Milbank Manufacturing
 - 4) Or Approved Equal
- D. Ground Lug/Bus Bar:
- 1. Provide a copper ground lug or a 1/4-inch by 2-inch copper bus bar in large pull and junction boxes.

2.03 SOURCE QUALITY CONTROL

A. Tests:

- 1. Submit factory test reports to the ENGINEER as specified for the products in this Section.

PART 3 EXECUTION

3.01 INSTALLERS

- A. Install the work of this Section only under the supervision of licensed electricians.

3.02 EXAMINATION

- A. Verify that conduit stub-ups to be mated with electrical boxes and enclosures are the correct type and size, and are at the proper location.

3.03 INSTALLATION

- A. Equipment and Control Device Enclosures:
 - 1. For corrosive locations, provide enclosures that meet the NEMA 250 requirements for Type 4X enclosures.
- B. Installing Boxes for Electrical Outlets and Devices:
 - 1. Install boxes level and plumb within 1/16-inch of vertical or horizontal over the length of the box.
 - 2. Unless otherwise indicated on the drawings, devices boxes for interior or exterior wiring devices of buildings shall be recessed within the wall construction. The installation of surface mounted device boxes is prohibited.
 - 3. Install device boxes at a uniform height as indicated on the Contract Drawings.
 - a. Mount all adjacent boxes in alignment at the same mounting height.
 - b. Mount outlet boxes for equipment within 18-inches of the equipment power connection.
 - 4. Do not install flush mounting boxes back-to-back in walls.
 - a. Provide a minimum separation of 6 inches (150 mm).
 - b. Provide a minimum separation of 24inches (600 mm) s in acoustic rated walls.
 - 5. When installing boxes outside or to exposed conduit, provide cast boxes.
 - a. For interior unfinished locations mount these boxes on spacers to be 1/8-inch from wall unless box has built-in raised pads to perform the same function.
 - 6. When installing boxes for single devices, two devices, or wall outlets, install 4-inch square boxes with appropriate plaster rings.
 - a. Space boxes on opposite sides of the wall 6 inches apart.
 - b. Set plaster rings flush or to protrude less than 1/16-inch from the wall.
 - c. Openings for boxes in finished walls must be within 1/16-inch of the box.
 - 1) Correct all oversize openings in accordance with the specifications for the wall material.
 - 7. Outlet boxes must be of the one-piece type, the use of expandable sheet metal boxes is prohibited.
 - 8. Support cast boxes for outlet and device using one of the following methods:
 - a. Mount the boxes directly to the structure using 4 or more anchors.
 - 1) Attach mounting screws to feet located outside of the box interior.
 - 2) Provide 1/4-inch spacers behind the boxes unless the box has raised pads.
 - b. Attach the box to two 1-inch or larger conduits which are supported within 12-inches of the box.
 - c. Attach the box to two 1-inch or larger conduits which exit from a poured concrete floor no further than 18-inches from the box.

- C. Installing Boxes for Other than Electrical Outlets and Devices:
 - 1. Accurately punch holes for conduit openings using a hydraulic punch and punches sized for the conduit to be installed.
 - 2. Install a conduit breather in the top of the box and a conduit drain fitting in the bottom of all boxes not located in bone-dry areas that are at least 100 feet from a hose-bib.
 - 3. Support boxes for other than electrical outlets and devices using one of the following methods:
 - a. Mount the boxes directly to the structure using 4 or more anchors.
 - 1) Attach mounting screws to feet located outside of the box interior, or seal the screw holes to prevent water penetration.
 - 2) Provide 1/4-inch spacers behind the boxes unless the box has raised pads.
 - b. Attach the box to two 1-inch or larger conduits which are supported within 12-inches of the box.
 - c. Attach the box to two 1-inch or larger conduits which exit from a poured concrete floor no further than 18-inches from the box.
 - d. Mount the box on U-channel and structural supports conforming to Section 26 05 28, Hangers and Supports.
- D. Make up all conduit connections to boxes in accordance with the requirements of Section 26 05 33.13, Conduit and Tubing.
- E. Install wiring in boxes in accordance with the requirements of Section 26 05 19, Low-Voltage Wire, Cable, and Accessories.
- F. Ground boxes in conformance with Section 26 05 26, Grounding and Bonding.

3.04 REPAIR/RESTORATION

- A. Touch up damaged coatings on electrical boxes and enclosures.

3.05 FIELD QUALITY CONTROL

- A. Site Tests:
 - 1. Test all boxes to verify that they are properly connected to the grounding system.
- B. Inspection:
 - 1. Inspect flush boxes to verify that the opening between the box and the wall finish is less than 1/16-inch.
 - 2. Inspect flush boxes to verify that each box is flush with the wall, or protrudes less than 1/16-inch, and is not set behind the wall surface.
 - 3. Inspect surface mounted boxes to verify that they are level and plumb within 1/16-inch as specified.
 - 4. Record the actual installed elevations and locations of pull and junction boxes on record drawings specified in Section 01 78 00, Closeout Submittals.

3.06 CLEANING**A. Waste Management and Disposal:**

1. Clear and dispose of waste materials in accordance with the requirements of Section 26 05 00, Common Work Results for Electrical.

3.07 PROTECTION

- A. Except for surfaces to be painted, mask electrical boxes to protect them from paint overspray or over-brushing during painting operations.
- B. Protect boxes against damage from other work.

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 26 05 63

ACCEPTANCE TESTING OF ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: The work specified in this Section consists of materials to performance test electrical systems and equipment.

1. Items Supplied Under This Section:

- a. Electrical System Testing
- b. Thermographic Testing
- c. Ground System Testing
- d. Insulation Testing
- e. Equipment Testing
- f. Performance Test
- g. Test Procedure
- h. Test Report

B. Related Sections:

- 1. Section 01 33 00 – Submittal Procedures
- 2. Section 26 05 00 – Common Work Results for Electrical
- 3. Section 35 22 26 – Slides Gates
- 4. Section 41 24 26 – Hydraulic Power Unit

1.02 REFERENCES

A. Reference Standards:

- 1. America National Standards Institute (ANSI): as applicable, including:
 - a. ANSI C2, National Electrical Safety Code.
 - b. ANSI Z244.1 American National Standards for Personnel Protection.
- 2. National Electrical Manufacturer's Association (NEMA): as applicable, including:
 - a. NEMA ICS 2.3 - Instructions for the Handling, Installation, Operation and Maintenance of Motor Control Centers.
 - b. NEMA ICS 7.1 - Safety Standards for Construction and Guide for selection, Installation, and Operation of Adjustable Speed Drive Systems.
 - c. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
 - d. NEMA PB 2.1 - Proper Handling, Installation, Operation and Maintenance of Deadfront Switchboards Rated 600 Volts or Less.
- 3. American Society for Testing and Materials (ASTM), as applicable.
- 4. Institute of Electrical and Electronics Engineers (IEEE), as applicable, including:
 - a. IEEE C.57.13, IEEE Standard Requirements for Instrument Transformers.
- 5. National Fire Protection Association (NFPA), as applicable, including:
 - a. NFPA 70 - National Electrical Code (NEC).
 - b. NFPA 70E - Electrical Safety Requirements for Employee Workplaces.

- c. NFPA 72 - National Fire Alarm Code (NFAC).
- 6. International Electrical Testing Association (IETA) as applicable, including:
 - a. Acceptance Testing Specifications for Electric Power Distribution Equipment and Systems.
- 7. Insulated Cable Engineer's Association (ICEA), as applicable.
- 8. State and Local Codes and Ordinances as applicable.
- 9. Occupational Safety and Health Administration (OSHA), as applicable, including: Title 29, Parts 1907, 1910 and 1936.
- 10. International Electrical Testing Association (IETA) as applicable, including:
 - a. ATS-2013: Acceptance Testing Specifications for Electric Power Distribution Equipment and Systems.
 - b. MTS-2013: Maintenance Testing Specifications for Electric Power Distribution Equipment and Systems.

1.03 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Provisions and all Supplementary General Provisions and all Supplementary General Provisions, and Section 26 05 00 – Common Work Results for Electrical:
- B. Submission to include the following:
 - 1. Field inspection report as required for each item of material and/or equipment outlined herein.
 - 2. Manufacturer's directions for use of ground megger with proposed method indicated.
- C. Test Reports:
 - 1. Each test report prepared by the respective testing firm(s) comply, where applicable, to all stipulations specified in Section 26 05 00 – Common Work Results for Electrical, for Operation, Maintenance and Installation Manuals with reference to preparation, paper requirements, indexing and binders. Include in each test report the following:
 - a. Summary of project.
 - b. Description of equipment tested.
 - c. Description of test.
 - d. Test results.
 - e. Conclusions and recommendations.
 - f. Appendix, including appropriate test forms.
 - g. Identification of test equipment used.
 - h. Signature of responsible test organization authority.
 - i. Furnish five copies of each completed report to the Design Electrical ENGINEER no later than 30 days after completion of each test. Assemble and certify the testing firm each final test report, which must be submitted to the Design ENGINEER for review, comments and subsequent approval.

1.04 QUALITY ASSURANCE

- A. Qualifications of Testing Laboratory: Select an independent nationally recognized testing laboratory that is independent from electrical contractor that either is a member of The International Electrical Testing Association or meets the following qualifications:
 - 1. Is nationally recognized as an electrical testing laboratory.
 - 2. Has been regularly engaged in the testing of electrical systems and equipment for at least 2 years.
 - 3. Is independent from the electrical contractor, the OWNER, and all other contractors on the job.
 - 4. Has at least one Professional Engineer on staff that is licensed in the State where the project site is located.
 - 5. Derives more than 75 percent of its income from electrical testing.
 - 6. Owns or leases sufficient calibrated equipment to do the testing required.
 - 7. Has a means to trace all test instrument calibration to The National Institute of Standards and Technology.
- B. Membership in the International Electrical Testing Association (NETA) shall be considered evidence of meeting items A. 1. through and including A. 5
- C. Testing shall be done under the supervision of a technician certified by International Electrical Testing Association or by technicians that are both certified by the National Society of Professional Engineers and experienced in electrical testing with 5 years of testing experience.
- D. The testing laboratory shall supervise or perform all testing of equipment and oversee setting of all circuit breakers and calibration of all instruments.
- E. The testing firm used must be approved by the ENGINEER.
- F. Include the cost of such tests in the CONTRACTOR's Bid Price for the applicable bid item.

1.05 GENERAL REQUIREMENTS

- A. Field Inspection:
 - 1. The CONTRACTOR is responsible for a complete inspection of all equipment, prior to testing and energizing to ascertain that it is free from any damage, scratches, or missing components and that all power connections are correct, and that they are tight in conformance with recommended standard practice. The inspection is to also include a check of control wiring, terminal connections and all bolts and nuts.
 - 2. Perform field inspection by the CONTRACTOR during a time when the ENGINEER is present to witness each inspection and its performance.
 - 3. Correct any deficiencies found during the inspection prior to the energizing and testing of the equipment.

1.06 SCHEDULING

- A. Schedule all testing with work of other contractors to ensure an orderly sequence of startup and completion of work.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 ELECTRICAL INSPECTIONS AND TESTS

- A. Perform, supervise, and furnish all test equipment needed to perform tests and provide safety measures, procedures and equipment required for each test.
- B. Schedule all testing with the ENGINEER. Perform testing in the presence of the ENGINEER except when the ENGINEER approves in writing conducting a specific test without the ENGINEER's presence.
- C. Notify all involved parties including the ENGINEER prior to tests, advising them of the test to be performed and the scheduled date and time.
- D. Coordinate the tests with others involved.
- E. Prepare written test procedures and forms used in the test reports and submit to the ENGINEER prior to commencement of testing.
- F. Include in each test report the following information:
 - 1. Job title.
 - 2. Date of test.
 - 3. Equipment, system or cable identification.
 - 4. Type of test.
 - 5. Description of test instrument and date of latest calibration.
 - 6. Section of specification defining test along with description of test and evaluations as reported by the testing company.
 - 7. Test results (correct all readings at 20 degrees C).
 - 8. Signature of person supervising test.
 - 9. Signature of CONTRACTOR.
 - 10. Space for ENGINEER's signature.
- G. Refer to individual tests and inspections hereinafter specified for any additional or specified requirements.
- H. Test Instrument Calibration:
 - 1. The testing firm is to have a calibration program, which assures that all applicable test instrumentation are maintained within rated accuracy.

2. The accuracy is to be directly traceable to The National Institute of Standards and Technology.
3. Instruments are to be calibrated in accordance with the following frequency schedule.
 - a. Field Instruments: Analog - 6 months maximum
Digital - 12 months maximum
 - b. Laboratory Instruments: 12 months
 - c. Leased specialty equipment: 12 months
4. Make dated calibration labels visible on all test equipment.
5. Keep records up-to-date, which show date and results of instruments calibrated or tested.
6. Maintain an up-to-date instrument calibration instruction and procedure for each test instrument.
7. Calibrating standard is to be of higher accuracy than that of the instrument tested.

I. Safety and Precautions:

1. Safety practices are to include, but are not limited to, the following requirements:
 - a. Occupational Safety and Health Act of 1970-OSHA.
 - b. Accident Prevention Manual for Industrial Operations, National Safety Council, Chapter 4.
 - c. Applicable State and Local safety operating procedures.
 - d. IETA Safety/Accident Prevention Program.
 - e. OWNER's safety practices.
 - f. National Fire Protection Association - NFPA 70E.
 - g. ANSI Z244.1 American National Standards for Personnel Protection.
2. Perform all tests with apparatus de-energized except where otherwise specifically required.
3. The testing firm is to have a designated safety representative on the project to supervise operations with respect to safety.

3.02 TESTING TO BE PERFORMED BY THE CONTRACTOR

- A. The CONTRACTOR is required to obtain copies of NETA ATS-2013 and MTS-2013, and to keep at least one copy of each at the project site, to use as reference for testing requirements.
- B. Continuity Test: Make test for continuity and correctness of wiring and identification on all conductors installed.
- C. Wire and Cable:
 1. Test all wires and cables sized No. 2 and larger in accordance with NETA ATS-2013.
 2. Perform visual, mechanical, and electrical tests on all No. 4 and No. 6 power cables that operate at voltages exceeding 150 volts to ground in accordance with NETA ATS-2013.
 3. Perform visual, mechanical, and electrical tests on all other wires and cables in accordance with NETA ATS-2013.

4. Replace any wires which have been damaged.
 5. Correct causes of all readings which do not meet the acceptable minimum insulation readings are as stated in NETA ATS-2013. Exceed the nominal expected temperatures for the actual load.
 6. Retest items requiring correction.
- D. Surge Protective Device (SPD):
1. Visually and mechanically inspect the SPD unit and connections.
 2. Use an AC voltmeter to check all voltages and ensure that normal operating voltages of the power system match the voltage rating on the SPD nameplate.
 3. Check LED status indicators on the display panels and suppression modules to confirm normal status.
 4. Press the alarm test button to confirm the audible alarm and LED.
 5. Operate the alarm silence switch to confirm proper operation.
- E. Test Interim:
1. CONTRACTOR's Personnel, without reliance of OWNER's Personnel, are to operate and maintain the equipment in continuous, day to day, 24 hour operation except as otherwise approved by the ENGINEER until commencement of the Final Mechanical Performance Test (see also Field Operational Testing in Specification Sections 35 22 26 – Slide Gates, and 41 24 26 – Hydraulic Power Unit).
 2. During this interim the CONTRACTOR's Personnel are to instruct and train the OWNER's Personnel in their duties.
- F. Final Mechanical Performance Test: Final Mechanical Performance Test is to cover the full duration of the Field Operational Testing described in Specification Sections 35 22 26 – Slide Gates, and 41 24 26 – Hydraulic Power Unit, including any additional testing necessary to demonstrate successful execution of the Field Operation Testing.
1. CONTRACTOR's Personnel are to demonstrate to the satisfaction of the ENGINEER that equipment is coordinated and that installation complies with the applicable Drawings and Specifications.
 2. Performance Tests are to be considered concluded upon the successful completion of the Field Operation Testing described in Specification Sections 35 22 26 – Slide Gates, and 41 24 26 – Hydraulic Power Units.

3.03 TESTING TO BE PERFORMED BY THE TESTING LABORATORY

- A. Select, hire and pay an independent nationally recognized electrical testing laboratory to perform all testing specified in this article. Obtain ENGINEER's approval of the testing laboratory and the testing laboratory proposed test procedure prior to commencement of any tests.
- B. Set all adjustments for all overcurrent protection devices in accordance with the protection and coordination study of Section 26 05 00 – Common Work Results for Electrical.

- C. Visually and mechanically inspect and electrically test items as scheduled in attached schedule for equipment in attached schedule equipment as listed in attached schedule in using the procedures of NETA ATS-2013. When a test for a particular item is not called out in ATS, test using the procedures in NETA MTS-2011.
- D. Thermographic Inspection:
1. Perform thermographic inspection of the electrical equipment and installations as listed below in accordance with NETA ATS-2013, and as detailed below. The following equipment is to be scanned:
 - a. Switchboards all ratings
 - b. Switchgear all ratings
 - c. Service Entrance Panelboards all ratings
 - d. Distribution Panelboards 50-Ampere and larger
 - e. Lighting Panelboards 50-Ampere and larger
 - f. Power Panelboards 50-Ampere and larger
 - g. Motor Control Centers all ratings
 - h. Dry Type Transformers 10 kVA and Larger
 - i. Individually Mounted Circuit Breakers 100 amp and larger
 - j. Disconnect Switches 100 amp and larger
 - k. Elevator Shunt-Trip Fused Disconnect Switches all ratings
 - l. Individually Mounted Motor Starters Size 1 and larger
 - m. Motors 30 HP and larger
 2. Provide report including the following items:
 - a. Items scanned
 - b. Whether item passed or failed
 - c. All items in NETA ATS-2013
 - d. The probable cause
 - e. Severity of defect
 - f. Recommended corrective measures
 - g. Video recording of test.
 3. Scan using an infrared camera with video scanner output to a display screen with a range of at least 1 degree C to 75 degrees C with an accuracy of 0.1 degree C and with the following equipment:
 - a. One 7 degree telephoto lens
 - b. One 20 degree wide angle lens
 - c. One 40 degree extra-wide angle lens
 4. Record output of camera during testing onto a DVD or store digital images of each piece of equipment inspected onto a CD as a record of the temperature variations. Record either by order or by digital imprinting the actual equipment being scanned. Turn off recordings during inactive periods or edit DVD to eliminate dead periods.
 5. Display data on a monitor capable of providing both a gray step mode and color monitor. These capabilities allow distinct temperature levels to be shown in black and white and color on the thermogram.
 6. Submit three copies of report and two copies of the DVD or CD.

7. Include DVD or CD of thermographs of the defective equipment and installations. Also include in report.
8. Submit both copies of the report to the ENGINEER who will make the determination of corrective measurements.

E. Grounding Electrode System Tests:

1. Visually and mechanically inspect and electrically test all made grounding electrode systems in accordance with NETA ATS-2013. For the point-to-point tests of NETA ATS-2013, measurements are only required for equipment conductors run with services, and feeders and branch circuits rated over 400 amperes.
2. Determine acceptable values as follows:
 - a. Main service entrance ground: 5 ohms.
 - b. Emergency/standby generator ground grid: 5 ohms.
 - c. Panelboards ground bus: 10 ohms.
 - d. Manhole ground rod electrodes: 25 ohms
 - e. Prior to the electric service being energized and prior to the installed products being covered, measure the ground system resistance to earth in the presence of the ENGINEER.
 - f. Grounds not otherwise covered in this Specification with a maximum of 25 ohms.
 - g. For continuity tests, determine the acceptable value for the equipment grounding conductor by the following formula:

$$R_{EquipGndCond} \leq 0.1 \times \frac{V_{LineToGnd}}{I_{OverCurrentProtection}}$$

Where the following definitions apply:

$R_{EquipGndCond}$ = The measured resistance of the Equipment Grounding Conductor.

$V_{linetoGnd}$ = The Nominal Line to Ground Voltage of the circuit or feeder.

$I_{overcurrentprotection}$ = The Trip, or Melting Current of the overcurrent protective device for the circuit.

3.04 CORRECTION OF DEFICIENCIES

- A. Report all unacceptable values immediately. Correct all deficiencies found in work of this contract and separately report deficiencies in work of items of other contracts.
 1. Retest items requiring correction. Correct or have corrected any remaining deficiencies and retest until work is acceptable.

3.05 RETESTING

- A. After equipment has been in service for a period of nine months repeat the following tests:
1. Thermographic testing. Correct all causes of readings above the nominal expected reading for the load encountered.
 2. Insulation tests of all motors over 100 horsepower, switchgear, switchboards, and transformers over 50 kVA.

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 26 28 16.13

LOW-VOLTAGE ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Requirements for furnishing, installing, connecting, energizing, testing, cleaning, and protecting low-voltage enclosed disconnect switches, hazardous location switches, and fuses.

B. Related Sections:

1. Section 01 33 00 – Submittal Procedures
2. Section 26 05 00 – Common Work Results for Electrical.
3. Section 26 05 19 – Low-Voltage Wire, Cable, and Accessories
4. Section 26 05 28 – Hangers and Supports for Electrical Systems.
5. Section 26 05 63 – Acceptance Testing of Electrical Systems.

1.02 REFERENCES

A. Reference Standards:

1. International Electrical Testing Association, Inc. (NETA):
 - a. ANSI/NETA ETT Standard for Certification of Electrical Testing Technicians.
2. National Electrical Manufacturers Association (NEMA):
 - a. NEMA 250; Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. NEMA KS 1; Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
3. National Fire Protection Association (NFPA):
 - a. NFPA 70; National Electrical Code (NEC).
4. Underwriter's Laboratories, Inc. (UL):
 - a. UL 98; Standard for Enclosed and Dead-Front Switches.

1.03 SUBMITTALS

A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Provisions and all Supplementary General Provisions.

1. Product Data:
 - a. Enclosed disconnect switches
 - b. Enclosed hazardous location switches
 - c. Fuses
2. Shop Drawings:
 - a. Enclosed disconnect switches

- b. Enclosed hazardous location switches
- 3. Quality Assurance/Control Submittals:
 - a. Certificates:
 - 1) Testing agency/quality verification listing cards, if required
 - 2) Manufacturers written statement indicating why items do not have quality assurance verification, if required
 - b. Manufacturer's instructions:
 - 1) Enclosed disconnect switches
 - c. Qualification Statements:
 - 1) Electrical testing laboratory's qualifications

1.04 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer Qualifications:
 - a. Employ licensed electricians to supervise installation of the work of this Section.
 - 2. Electrical Testing Laboratory (ETL) Qualifications:
 - a. Use a NETA accredited electrical testing laboratory, or approved equal, that is accredited according to ANSI/NETA ETT for the region in which the Contract work is performed.
 - b. Submit the electrical testing laboratory's qualifications to the ENGINEER.
- B. Regulatory Requirements:
 - 1. Conform all work to NFPA 70, the National Electrical Code.
- C. Certifications:
 - 1. Provide products that are either listed and labeled by Underwriters Laboratory, approved by Factory Mutual, or certified as meeting the standards of UL by the Electrical Testing Laboratory (ETL) for the location installed in, and the application intended, unless products meeting the requirements of these testing laboratories are not available or unless standards do not exist for the products.

1.05 MAINTENANCE

- A. Extra Materials:
 - 1. Provide one set of spare fuses for each point of use including all of the ampere sizes indicated for the location.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Use of Trade Names:

1. The use of trade names within the Contract Documents is intended to establish the basis of design and to illustrate the constructability and level of quality required.
2. The use of trade names is not intended to exclude other manufacturers whose products are equivalent to those named, subject to compliance with Contract requirements.

2.02 MANUFACTURED UNITS

A. Enclosed Disconnect Switches:

1. Provide enclosed disconnect switches that meet the requirements of NEMA KS 1 and UL 98, and that are as shown on the Contract Drawings.
 - a. Types:
 - 1) Heavy duty fusible type.
 - a) Provide positive pressure fuse clips.
 - b) Provide fuses as specified
 - 2) Heavy duty non-fusible type.
 - b. Provide enclosed disconnect switches rated for the horsepower, voltage, and amperage as indicated on the Contract Drawings.
 - c. Provide enclosed disconnect switches with the number of poles and of the type indicated on the Contract Drawings.
2. Enclosure:
 - a. Provide enclosures consisting of a box and cover conforming to the requirements of NEMA 250 and of the type indicated or scheduled on the Contract Drawings.
 - 1) If not otherwise specified, provide enclosures conforming to the requirements of NEMA 250, type 1.
 - b. Material:
 - 1) Construct enclosures of code gauge sheet steel per the requirements of UL 98.
 - c. Finish:
 - 1) Apply a rust-inhibiting phosphate coating to the enclosure's sheet steel, and then finish the enclosure in gray baked enamel.
 - d. Provide a permanent label with the manufacturer's switch type, catalog number, and horsepower rating on the enclosure.
3. Switch Mechanism:
 - a. Provide a quick-make, quick-break operating handle and switch mechanism integral to the box or body, not the cover.
 - 1) Provide dead front construction with permanent arc suppressors and dual cover interlocks to prevent an unauthorized opening of the switch enclosure when the switch is in the ON position.
 - 2) Provide the means to positively padlock the switch in the OFF position.
 - b. Provide a switch designed so that the switch blades are visible in the OFF position when door is open.

- c. Provide UL-listed switch lugs for front removable copper cables.
 - d. Electroplate the switch's current carrying parts to provide resistance to corrosion.
 - 4. Acceptable Manufacturers:
 - a. Square D Company
 - b. Eaton Electric
 - c. General Electric
 - d. Siemens Industry for LV Power Distribution
 - e. Or Approved Equal
- B. Fuses:
- 1. Provide current limiting type fuses rated for the voltage and amperage as indicated on the Contract Drawings for those low-voltage switches requiring fuses.
 - a. For non-motor loads, provide UL Class RK1 single element, fast-acting type fuses.
 - b. For motor, welder, and transformer loads, provide UL Class RK5 dual element, time-delay type fuses.
 - 2. Acceptable Manufacturers:
 - a. Cooper Bussman
 - 1) UL Class RK1: Limitron®.
 - 2) UL Class RK5: Fusetron®.
 - b. Gould-Shawmut.
 - c. Or Approved Equal.

2.03 SOURCE QUALITY CONTROL

- A. Testing Agency/Quality Verification:
- 1. Perform the standard low-voltage enclosed switch factory tests specified in NEMA KS 1 and UL 98.
 - 2. Submit evidence of testing agency/quality verification, listing, and labeling for each product with the submitted product data either by providing a printed mark on the data or by attaching a separate listing card.
 - a. For items without such evidence, provide a written statement from the product manufacturer that indicates why it does not have quality assurance verification.
 - b. Such statements are subject to the approval of the ENGINEER.

PART 3 EXECUTION

3.01 INSTALLERS

- A. Install the work of this Section only under the supervision of licensed electricians.

3.02 PREPARATION

- A. Provide a prime and finish coat of paint for painted surfaces that will be covered by items provided under this Section.
- B. Prior to painting operations, mask all nameplates, plastic parts, push buttons, operating shafts, and other items not to be painted.
- C. Ensure that all indoor areas to receive the items provided under this Section are enclosed from the weather.

3.03 INSTALLATION

- A. Install disconnect switches and hazardous location switches in accordance with the switch manufacturer's instructions.
 - 1. Mount enclosures on 1/4-inch (6mm) spacers or U-channel supports to provide a space between enclosures and mounting surfaces.
 - a. Provide supports as specified in Section 26 05 28 – Hangers and Supports.
 - 2. Set the top of enclosures 6'-6" above the finished floor or grade unless otherwise indicated or specified.
- B. Install the switch's conduit and wiring:
 - 1. Punch holes in the disconnect switch enclosures for conduit entries, except use the pre-tapped hubs and integral bushings for attaching conduit to hazardous location switch enclosures.
 - a. Connect conduit to disconnect switch enclosures with water-tight hubs except as follows:
 - 1) In dry locations, either the watertight hubs or two locknuts and bushings may be used to connect conduits to the disconnect switch enclosure.
 - 2) In damp locations, either the watertight hubs or a sealing locknut, interior locknut, and grounding bushing may be used on the bottom of the enclosures.
 - b. In wet and/or hazardous areas, install a conduit drain-fitting in a hole punched in the bottom of the enclosure, and install a conduit breather fitting in a hole punched in the top of the enclosure.
 - 2. Remove or protect components installed in the interior of enclosures during wire pulling.
 - 3. Use lugs provided by or approved by the disconnect switch manufacturer to connect wiring to the disconnect switch's line and load terminals in conformance with Section 26 05 19 – Low-Voltage Wire, Cable, and Accessories.
- C. Identify low-voltage enclosed switches in accordance with OWNER identification system.

3.04 FIELD QUALITY CONTROL

- A. Site Testing:
1. Prior to energizing the low-voltage enclosed switches:
 - a. Perform insulation testing and ensure that all load-side wiring is clear of shorts in accordance with the requirements of Section 26 05 63 – Electrical Testing.
 2. Final testing after energizing the circuit breakers:
 - a. Perform the thermographic test in conformity with Section 26 05 63 – Electrical Testing, and record the circuit parameters.

3.05 PROTECTION

- A. Protect the items provided under this Section during the performance of work provided under other Sections, especially during welding and cutting operations.
- B. Protect the low-voltage enclosed switches against overloads, short-circuits, and improper operation.
1. Pad-lock the low-voltage enclosed switches in the off position when work is being done on downstream circuits.

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 26 28 16.19

LOW-VOLTAGE ENCLOSED CIRCUIT BREAKERS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Requirements for furnishing, installing, connecting, energizing, testing, cleaning, and protecting enclosed, low-voltage, individually mounted molded-case circuit breakers.

B. Related Sections:

1. Section 01 33 00 – Submittal Procedures
2. Section 26 05 00 – Common Work Results for Electrical
3. Section 26 05 19 – Low-Voltage Wire, Cable, and Accessories
4. Section 26 05 28 – Hangers and Supports for Electrical Systems.
5. Section 26 05 63 – Acceptance Testing of Electrical Systems.

1.02 REFERENCES

A. Definitions:

1. AIC: An acronym for ampere interrupting capacity.
2. AWG: An acronym for American Wire Gage, which is a standard system of designating electrical wire sizes specified in ASTM B 258.

B. Reference Standards:

1. American Society for Testing and Materials (ASTM):
 - a. ASTM B 258, Standard Specification for Standard Nominal Diameters and Cross-Sectional Areas of AWG Sizes of Solid Round Wires Used as Electrical Conductors.
2. National Electrical Manufacturers Association (NEMA):
 - a. NEMA 250; Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. NEMA AB 1; Molded-Case Circuit Breakers, Molded Case Switches, and Circuit-Breaker Enclosures.
3. National Fire Protection Association (NFPA):
 - a. NFPA 70; National Electrical Code (NEC).
4. Underwriter's Laboratories, Inc. (UL):
 - a. UL 489; Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.

1.03 DESIGN REQUIREMENTS

- A. Design molded-case circuit breakers in conformance with the requirements of both NEMA AB 1 and UL 489.

1.04 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Provisions and all Supplementary General Provisions.
 - 1. Product Data:
 - a. Enclosed molded-case circuit breakers
 - b. Circuit breaker enclosures
 - 2. Shop Drawings:
 - a. Enclosed molded-case circuit breakers
 - 3. Quality Assurance/Control Submittals:
 - a. Certificates:
 - 1) Testing agency/quality verification listing cards, if required
 - 2) Manufacturers written statement indicating why items do not have quality assurance verification, if required
 - b. Manufacturer's instructions:
 - 1) Enclosed circuit breakers

1.05 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Employ licensed electricians to supervise installation of the work of this Section.
- B. Regulatory Requirements:
 - 1. Conform all work to NFPA 70, the National Electrical Code.
- C. Certifications:
 - 1. Provide products that are either listed and labeled by Underwriters Laboratory, approved by factory mutual, or certified as meeting the standards of UL by the Electrical Testing Laboratory (ETL) for the location installed in, and the application intended, unless products meeting the requirements of these testing laboratories are not available or unless standards do not exist for the products.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Use of Trade Names:
 - 1. The use of trade names within the Contract Documents is intended to establish the basis of design and to illustrate the constructability and level of quality required.
 - 2. The use of trade names is not intended to exclude other manufacturers whose products are equivalent to those named, subject to compliance with Contract requirements.
- B. Provide circuit-breaker enclosures from the same manufacturer as the circuit-breaker.
- C. Acceptable Manufacturers:
 - 1. Manufacturers offering products which can meet the requirements of this Section include, but are not limited to, the following:

- a. Square D Company
- b. Eaton Electric
- c. General Electric
- d. Siemens Industry for LV Power Distribution
- e. Or Approved Equal

2.02 MANUFACTURED UNITS

A. Enclosed Molded-Case Circuit-Breakers:

1. Provide quick make-quick break, unit type molded-case circuit breakers with a thermal magnetic overload trip and lugs on both ends.
 - a. Equip the circuit breakers with mechanically trip-free toggle handles.
 - b. Equip multiple pole breakers with an internal common trip.
 - c. Provide 15 and 20 ampere circuit breakers with lugs capable of accommodating one wire between 14 AWG and 10 AWG.
2. Provide circuit breakers with the Voltage rating, poles, trip setting, and UL listed AIC rating as indicated on the Contract Drawings.
3. Provide factory-installed accessories as indicated and specified.

B. Enclosures:

1. Provide enclosures conforming to the requirements of NEMA 250, type 1.
 - a. Provide enclosures of the type indicated or scheduled on the Contract Drawings.
 - b. Unless otherwise indicated or scheduled, provide surface-mounted enclosures.
2. Provide enclosures sized to contain the circuit breaker and all other required items.
 - a. Provide an interlock that prevents opening the enclosure door when the circuit breaker is in the "ON" position.
 - 1) Provide an interlock defeater, which requires a common hand-tool to operate.
 - b. Provide a copper ground-bus or ground-stud rated for 100 percent of the circuit breaker's capacity.
3. Provide each enclosure with an external operator that positively indicates the "ON", "OFF", and "TRIPPED" positions of the enclosed circuit breaker.
4. Provide the capability to pad-lock the circuit breaker in the "ON" and the "OFF" positions by using three padlocks.
5. If the circuit-breaker is connected to a system with a grounded neutral, provide a copper solid-neutral bus or terminal-lug with a 100 percent rating, and suitable lugs for all incoming and outgoing cables.

2.03 SOURCE QUALITY CONTROL

A. Testing Agency/Quality Verification:

1. Perform the standard circuit breaker factory tests specified in NEMA AB 1 and UL 489.

2. Submit evidence of testing agency/quality verification, listing, and labeling for each product with the submitted product data either by providing a printed mark on the data or by attaching a separate listing card.
 - a. For items without such evidence, provide a written statement from the product manufacturer that indicates why it does not have quality assurance verification.
 - b. Such statements are subject to the approval of the ENGINEER.

PART 3 EXECUTION

3.01 INSTALLERS

- A. Install the work of this Section only under the supervision of licensed electricians.

3.02 PREPARATION

- A. Provide a prime and finish coat of paint for painted surfaces that will be covered by items provided under this Section.
- B. Prior to painting operations, mask all nameplates, plastic parts, operating shafts, and other items not to be painted.
- C. Ensure that all indoor areas to receive the items provided under this Section are enclosed from the weather.

3.03 INSTALLATION

- A. Install circuit breakers in accordance with the circuit breaker manufacturer's instructions.
 1. Mount enclosures on 1/4-inch (6mm) spacers or U-channel supports to provide a space between enclosures and mounting surfaces.
 - a. Provide supports as specified in Section 26 05 28 - Hangers and Supports for Electrical Systems.
 2. Set the top of enclosures 6'-6" above the finished floor or grade unless otherwise indicated or specified.
- B. Install circuit breaker conduit and wiring:
 1. Punch holes in the enclosures for conduit entries.
 2. In dry locations, two locknuts and bushings may be used to connect conduits to the circuit breaker enclosure.
 3. In damp locations and on the bottom of enclosures, connect conduits to the circuit breaker enclosure with watertight hubs or a sealing locknut.
 4. Except in dry areas, install a conduit drain-fitting in a hole punched in the bottom of the enclosure, and install a conduit breather fitting in the top of the enclosure.
 5. Remove or protect components installed in the interior of enclosures during wire pulling.

6. Use lugs provided or approved by the circuit breaker manufacturer to connect wiring to the circuit breaker's line and load terminals in conformance with Section 26 05 19 – Low-Voltage Wire, Cable, and Accessories.

C. Identify circuit breakers in accordance with the OWNER identification system.

3.04 FIELD QUALITY CONTROL

A. Site Testing:

1. Prior to energizing the circuit breakers:
 - a. Perform insulation testing and ensure that all load-side wiring is clear of shorts in accordance with the requirements of Section 26 05 63, Acceptance Testing of Electrical Systems.
 - b. Set and adjust overcurrent protective devices in conformance with the requirements of Section 26 05 63 – Acceptance Testing of Electrical Systems.
 - c. Open all downstream disconnects and the circuit breaker.
2. Final testing after energizing the circuit breakers:
 - a. Perform the thermographic test in conformity with Section 26 05 63, Acceptance Testing of Electrical Systems, and record the circuit parameters.

3.05 PROTECTION

- A. Protect the items provided under this Section during the performance of work provided under other Sections, especially during welding and cutting operations.
- B. Protect circuit breakers against overloads, short-circuits, and improper operation.
 1. Pad-lock the circuit breakers in the off position when work is being done on downstream circuits.

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 35 22 26
SLIDE GATES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Provision for two (2) new 84"x96" stainless steel slide gates, frame, and accessories. See Drawings for additional information.
 - 2. Installation (including insulating gasket (and bolt sleeves if applicable), and anchorage) and testing.
- B. The following items are OWNER supplied and will be manufactured and/or delivered to the site by Hydro Gate, Inc. (Gate Manufacturer):
 - 1. Two (2) new 84"x96" slide gates and frames, including UHMW seats/seals and fasteners.
 - 2. Two (2) new 84"x96" Type "E" full-face insulating gasket sets.
 - 3. See also Work by Owner under Section 01 11 00 – Summary of Work.
- C. CONTRACTOR shall not include the price of the OWNER supplied slide gate items and delivery in their bid, however, CONTRACTOR is responsible for offloading the OWNER supplied slide gate items from the delivery truck, coordination with the Gate Manufacturer, coordination with all WORK, coordination of submittals, installation, testing, and acceptance.
- D. Related Sections:
 - 1. General Provisions and Supplementary General Provisions
 - 2. Section 01 11 00 – Summary of Work.
 - 3. Section 01 33 00 – Submittal Procedures.
 - 4. Section 01 78 00 – Closeout Submittals.
 - 5. Section 02 41 00 – Demolition.
 - 6. Section 05 05 19 – Post-Installed Concrete Anchors
 - 7. Section 05 50 00 – Metal Fabrication.
 - 8. Section 41 24 26 – Hydraulic Power Unit.

1.02 REFERENCES

- A. Definitions:
 - 1. Bottom seal: compressive resilient seal (sometimes called sill) mechanically fastened to the frame with watertight contact with frame, slide (in the closed position), and vertical seats and seals.
 - 2. EPDM: Ethylene Propylene Diene Monomer.
 - 3. Face and back pressure heads: Head at vertical distance from center of gate opening to maximum water surface.

4. Frame: Fixed portion of the slide gate assembly (sometimes called body) consisting of formed and fully welded one-piece construction with mounting flange, extended guides, and mounting features for seats and seals.
5. Seats: UHMW polyethylene rectangular bar stock machined to accommodate mounting to the gate frame with stainless steel hardware and to provide watertight contact with the frame and where seats contact each other and contact bottom seal.
6. Seals: At the manufacturer's option, resilient seals to provide additional sealing along the sides and top of the gate opening with the slide in the closed position.
7. Slide: Moveable part of the gate (sometimes called slide or leaf) consisting of welded ribbed reinforced plate with mounting features for seats and seals if applicable and for stem.
8. UHMW: Ultra-High-Molecular-Weight.

B. Reference Standards:

1. American Society for Testing and Materials (ASTM):
 - a. ASTM A 240-19 – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and General Service.
 - b. ASTM A276-17 – Standard Specification for Stainless Steel Bars and Shapes.
 - c. ASTM A193/193M-19 – Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
 - d. ASTM A312-19 – Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipe
 - e. ASTM A380-17 – Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems
 - f. ASTM B584-14 – Standard Specification for Copper Alloy Sand castings for General Applications
 - g. ASTM A967 – Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts
 - h. STM D2000-18 – Standard Classification System for Rubber Products in Automotive Applications (SAE Recommended Practice J200).
 - i. ASTM D4020-18 – Standard Specification for Ultra-High-Molecular-Weight Polyethylene Molding and Extrusion Materials.
 - j. ASTM F593-17 – Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
 - k. ASTM F594-09 – Standard Specification for Stainless Steel Nuts
 - l. Special Technical Publication 538 – Cleaning Stainless Steel
2. American Water Works Association:
 - a. AWWA C561-04 - Fabricated Stainless Steel Slide Gates.
3. American Welding Society:
 - a. ANSI/AWS D1.6/D1.6M – Structural Welding Code – Stainless Steel

1.03 SYSTEM DESCRIPTION

- A. Design Requirements: Provide slide gates and frames of type and size indicated in following schedule.

Table 1.03A

Gate No.	Gate Material	Gate Size (W x H) (inches)	Normal Face Head at gate centerline (feet)	Max. Design Face Head for gate and frame (feet)	Wall Thimble	Operating Speed (inches per minute)
5	316 Stainless Steel	84x96	37	42.5	Existing cast-iron (rectangle)	12 (+/- 4)
6	316 Stainless Steel	84x96	49	54.5	Existing cast-iron (rectangle)	12 (+/- 4)

1.04 SUBMITTALS

- A. Submit documentation as required to the ENGINEER in accordance with Section 01 33 00, Submittal Procedures, the requirements of the General Provisions and all Supplementary General Provisions. For OWNER supplied products, coordinate with the product manufacturer for the required submittals.
1. Shop Drawings:
 - a. Complete description of all materials including the material thickness of all structural components of the frame, slide, seats and stem block attachment.
 - b. Installation drawings showing assembly, type, size, all details of construction, details required for installation, dimensions and anchor bolt locations.
 2. Calculations indicating suitability of gates.
 3. Gate manufacturer's discharge coefficient and flow rating curve at normal pool.
 4. Maximum bending stress and deflection of the slide under the maximum design head.
 5. Gate factory test reports.
 6. Gate Installation Plan.
 7. Field Leak Test Plan.
 8. Field Leak Test Report.
 9. Field Operational Testing Plan.
 10. Operational Testing and Final Adjustment Report.
 11. Operation and maintenance manual: The manual shall include all previously approved drawings and data, slide gate as-built drawings, and operation and maintenance instructions for the gates, and applicable components.
 12. Gate Manufacturer Warranty.
 13. Contractor's Warranty.
 14. See also Specification Section 01 78 00, Closeout Submittals.

1.05 QUALITY ASSURANCE

- A. The CONTRACTOR shall have the following minimum requirements:

1. At least five (5) successful installations of slide gates in the last 10 years including at least two (2) of which that are 72"x72" or larger.
- B. Manufacturer's shop welds, welding procedures, and welders shall be qualified and certified in accordance with the requirements of ANSI/AWS D1.6.
- C. Basis of Design: Slide Gate specifications are based on AWWA C561 Fabricated Stainless Steel Slide Gates and Hydro Gate, Inc. model HG561-240 Slide Gate (non self-contained, thimble mounted).

1.06 DELIVERY, STORAGE, AND HANDLING

- A. The Gate Manufacturer (Hydro Gate, Inc.) is responsible for shipping and delivering the OWNER supplied slide gates, frames and accessories (UHMW seats/seals, fasteners, and insulating gaskets) to the project site.
 1. The slide gate frame and slide shall be shipped fully assembled by the Gate Manufacturer.
 2. All components of the slide gate shall be crated, wrapped, and otherwise protected from damage during shipment. Any repairs required, including coatings and re-passivation, shall be at no cost to the PROJECT.
- B. The CONTRACTOR is responsible for unloading the gates, storage and handling.
- C. Before unloading the gates, the CONTRACTOR is responsible for fully inspecting the gates, frames and gaskets for damages. If damaged, the CONTRACTOR shall notify the ENGINEER immediately.
- D. Store gates and accessories above the ground surface on platforms, skids, blocking, or other supports.
- E. Locate and provide protection from conditions that produce oxidation and contamination.
- F. Handle and store to prevent contamination, to prevent compromising the stainless steel passive film and so no parts are bent, broken, or otherwise damaged, and avoid damage to other material and work.

1.07 WARRANTY

- A. The Gate Manufacturer (Hydro Gate, Inc.) to provide their standard 18-month warranty for Hydro Gate, Inc. supplied slide gates and accessories.
- B. The CONTRACTOR shall provide a minimum two (2) year warranty for all equipment and WORK supplied under this specification, with the sole exception of the gate manufacturer's equipment warranty which shall be 18-months. The warranty period shall begin from the date of Final Completion. Any defects of design, workmanship, or materials, that would result in non-compliance with the Contract

specifications, shall be fully corrected by the CONTRACTOR (including parts and labor) at no additional cost.

PART 2 PRODUCTS

2.01 STAINLESS STEEL SLIDE GATE

- A. OWNER supplied vertically mounted 316L stainless steel slide gates and frame with UHMW seats/seals meeting requirements of AWWA C561 with opening size and shape as indicated on the Drawings.
- B. Gate shall be as specified herein and have the characteristics and dimensions shown on the Contract Drawings.
- C. Leakage shall not exceed 0.10 gpm/ft of wetted seal perimeter (or 3 gpm for an 84"x96" gate) in seating head conditions per AWWA C561.
- D. All structural components of the frame and slide shall be fabricated of stainless steel having a minimum thickness of 1/4-inch and shall have adequate strength to prevent distortion during normal handling, during installation, and while in service.
- E. Slide gate frames shall be shipped fully assembled with the invert member welded to the side frames and the slide installed in the frame.
- F. All welds shall be performed by welders with AWS D1.6 certification.
- G. Finish: Mill finish on stainless steel. Welds shall be sandblasted to remove weld burn and scale. All weld spatter shall be removed.
- H. Surface Preparation: Stainless steel shall be prepared and passivated before shipping in accordance with ASTM A380.
- I. Materials:

<u>Components</u>	<u>Materials</u>
Frame Assembly & Retainers	Stainless Steel, Type 316L, ASTM A240/A240M
Slide and Stiffeners	Stainless Steel, Type 316L, ASTM A240/A240M
Anchor Studs	Stainless Steel, Type 316, ASTM A276
Fasteners and Nuts	Stainless Steel, Type 316, ASTM F593/F594
Invert Seal	Neoprene or EPDM ASTM D2000, 60 Durometer
Seat/Seals and Facing	UHMW Polyethylene ASTM D4020
Lift Nuts	Bronze ASTM B584
Gasket	EPDM, ASTM S2000
	or
	Neoprene-or nitrile-faced phenolic
- J. Frame:

1. OWNER supplied vertically mounted 316L stainless steel slide frame meeting requirements of AWWA C561 with opening size and shape as indicated on the Drawings.
2. The frame guides shall extend to accommodate 13-inches of gate opening overtravel.
3. The frame assembly, including the guide members, and invert member, shall be constructed of formed stainless steel plate with a minimum thickness of 1/4-inch.
4. Frame bolt hole locations within the existing thimble footprint shall be coordinated to align with and seal to the existing thimble bolt holes with additional bolt holes per the Gate Manufacturer.
5. Frame tabs and bolt holes outside of the thimble footprint shall be coordinated with the Gate Manufacturer and located to avoid existing anchors and structural reinforcing steel.
6. Frame bolt holes shall be slotted during fabrication by the Gate Manufacturer to allow for adjustments in the field. No field cutting will be permitted.
7. Insulating gasket set provided by Gate Manufacturer shall be either EPDM or neoprene-or nitrile-faced phenolic, Type "E," cut to provide full-face seal and to accommodate insulating sleeves if sleeves are to be provided by the Contractor. Gasket maximum thickness is to be 1/8-inch. Bolt sleeves shall be a minimum of 1/16-inch thick.
8. Frame design shall allow for mounting to the existing wall thimble with stainless steel anchors (provided by the CONTRACTOR) and insulating gasket to electrically isolate the new stainless steel slide gate from the existing cast-iron thimble and any steel reinforcement. Mounting details shall be shown on the Installation Drawing submittal. Mounting details shall ensure electrical isolation from the existing cast-iron wall thimble and reinforcing steel. Acceptable methods for isolating the gate at the anchors are (but are not limited to):
 - a. Isolated stainless steel anchors (provided by the CONTRACTOR):
 - 1) Anchor holes drilled through the thimble flange large enough to provide electrical isolation from the thimble and any reinforcing steel encountered during drilling.
 - 2) If possible, locate anchors to align with existing thimble flange tapped holes to facilitate installation.
 - 3) Provide a means (such as dielectric sleeve spacers at each end of the hole) to center the anchor in the hole to prevent contact with reinforcing steel and with the thimble.
 - 4) Provide verification, by electrical continuity test, to ensure that isolation is maintained while grouting the anchors in place.
 - 5) Install slide gate using cut-to-fit insulating gasket between the thimble and gate frame to electrically isolate the gate from the thimble.
 - 6) CONTRACTOR provided adhesive anchors in place in accordance with manufacturer's instructions (see Specification Section 05 05 19 – Post-Installed Concrete Anchors).
 - b. Or approved substitution alternative.
9. Install slide gate using cut-to-fit insulating gasket between the thimble and gate frame and insulating sleeve and washer set at each anchor and stud to electrically

isolate the gate from the thimble and reinforcing steel. Provide verification, by electrical continuity test, to ensure that isolation is maintained while installing the gate.

10. The structural portion of the frame that incorporates the seat/seals shall be formed into a one-piece shape for rigidity. Guide members that consist of two or more bolted structural members are not acceptable. Guide member designs where water loads are transferred through the assembly bolts are specifically not acceptable.
11. Gussets shall be provided as necessary to support the guide members in an unseating head condition. The gussets shall extend to support the outer portion of the guide assembly and shall be positioned to ensure that the load is transferred to the anchor bolts or the wall thimble studs and anchors.
12. A rigid stainless steel invert member shall be provided across the bottom of the opening. The invert member shall be of the flush bottom type on upward opening gates.
13. A rigid stainless steel top seal member shall be provided across the top of the opening on gates designed to cover submerged openings.

K. Slide:

1. OWNER supplied vertically mounted 316L stainless steel slide meeting requirements of AWWA C561 with opening size and shape as indicated on the Drawings.
2. The slide and reinforcing stiffeners shall be constructed of stainless steel. All structural components shall have a minimum thickness of 1/4-inch.
 - a. The slide shall not deflect more than 1/720 of the span or 1/16 inch, whichever is smaller, under the maximum design head.
 - b. Reinforcing stiffeners shall be welded to the slide and mounted horizontally. Vertical stiffeners shall be welded on the outside of the horizontal stiffeners for additional reinforcement. When required to maintain proper plate stress and deflection intermediate vertical gussets shall be provided. Appropriate safety factors shall be applied to the ultimate tensile and yield strength of the material.
 - c. The slide shall include a stem nut pocket suitable to contain and constrain the existing stem nut with sufficient clearance to accommodate slight movement in the slide within the limits of the guides and seats.

L. Seals:

1. OWNER supplied seals.
2. All gates shall be provided with a self-adjusting seal system to restrict leakage in accordance with the requirements listed in this specification.
 - a. All gates shall be equipped with UHMW polyethylene seat/seals to restrict leakage and to prevent metal to metal contact between the frame and slide. Seat contact pressure shall not exceed 600 psi at the design head.
 - b. The side seat/seals shall extend to 1-1/2 x the travel of the slide to provide continuous support of the slide when the slide is in the fully-closed to opened position.

- c. The gates shall be provided with a resilient seal to seal the bottom portion of the gate. The seal shall be attached to the invert member or the bottom of the slide and it shall be held in place with stainless steel attachment hardware.
 - d. The seal system shall be durable and shall be designed to accommodate high velocities and frequent cycling without loosening or suffering damage.
 - e. All seats and seals must be bolted or otherwise mechanically fastened to the frame or slide. Arrangement with seals that are force fit or held in place with adhesives are unacceptable.
 - f. The seals shall be mounted so as not to obstruct the water way opening.
 - g. Gates that utilize rubber “J” seals or “P” seals are not acceptable.
 - h. The seal system shall have been factory tested to confirm negligible wear (less than 0.01”) and proper sealing. The factory testing shall consist of an accelerated wear test comprising a minimum of 25,000 open-close cycles using a well-agitated sand/water mixture to simulate fluidized grit.
- M. Hardware:
- 1. CONTRACTOR supplied.
 - 2. Bolts, nuts, washers of AISI Type 316 stainless steel conforming to ASTM A276.
- N. Coating:
- 1. None. Do not paint stainless steel, bronze, or non-metallic components.
- O. Fabrication
- 1. The slide gate slide and frame shall be fully assembled in the shop to ensure that the components fit together properly, with proper clearances and alignment.
 - 2. See also Specification Section 05 50 00, Metal Fabrication.
- P. Manufacturer:
- 1. Hydro Gate, Inc.
12000 East 47th Ave., Suite 200
Denver, CO 80239
<https://www.hydrogate.com/>

2.02 EXISTING COMPONENTS

- A. Stem:
- 1. Existing 3.5-inch diameter stainless steel.
 - 2. CONTRACTOR to verify stem diameter.
- B. Stem Guides:
- 1. Existing.
- C. Wall Thimbles:
- 1. Existing cast iron.
 - 2. CONTRACTOR to recoat the existing thimbles. See Specification Section 09 90 00 Painting.
- D. Actuators:

1. Existing hydraulic cylinders.
 - a. Gate No. 5: 7-inch diameter bore.
 - b. Gate No. 6: 8-inch diameter bore.

E. Pedestals:

1. Existing.

2.03 SOURCE QUALITY CONTROL

A. Shop Testing

1. Notify the ENGINEER in writing a minimum of 30 days in advance of beginning shop tests.
2. Shop Operating Tests:
 - a. The slide gate shall be fully opened and fully closed at least ten (10) times in the shop to demonstrate that the slide moves freely, and there is no binding or unusual noise. The slide may be operated manually by some shop means to prevent overloading the gate frame prior to installation.
 - b. The slide gate frame shall be test-fit to a comparable wall thimble to ensure that the gate frame and wall thimble flanges and bolt holes match.
3. The ENGINEER and/or OWNER may make visits to the gate manufacturer's fabrication facilities to review progress of the work. Shop testing shall be performed in the presence of the ENGINEER, unless waived.

PART 3 EXECUTION

3.01 PRE-INSTALLATION

- A. The CONTRACTOR shall verify and coordinate/relay all dimensions with the Gate Manufacturer in advanced of gate fabrication.
- B. The CONTRACTOR shall field locate reinforcing steel using ground penetrating radar (GPR) within the vicinity of the upper gate frame (guide) anchor tabs and submit a dimensioned plan in accordance with Specification Section 01 33 00.
- C. Complete related demolition work prior to gate installation. See Specification Section 02 41 00, Demolition.

3.02 INSTALLATION

- A. CONTRACTOR shall prepare a Gate Installation Plan describing the equipment, procedures and means for the gate installation. The Gate Installation Plan shall include handling procedures, rigging plan, and how and where the gate will be lifted from the bridge deck into the upstream well and installed including clearances.
- B. CONTRACTOR shall fully inspect the gates, frames and gaskets for damages during handling and prior to anchoring to the wall. If damaged, the CONTRACTOR shall notify the ENGINEER immediately.

- C. Install the slide gate and appurtenances in accordance with the AWWA C561, with manufacturer's shop drawings, with approved submitted written installation instructions.
 - 1. Install gates in manner to prevent leakage past seats.
 - 2. Leakage between gate frame and wall thimble: None allowed.
- D. The CONTRACTOR shall furnish all necessary components such as studs, bolts, washers, nuts, anchors, sealants (as recommended by gasket or gate manufacturer, gaskets, fasteners, insulating sets (as applicable), and other hardware for a complete installation unless specified otherwise.
- E. Wall Thimble Coordination:
 - 1. The alignment of the wall thimble and transition shall be carefully maintained to provide a smooth fluidway through the interior of the components.
- F. The slide gate frame and slide shall be attached to the wall thimble with appropriate anchors, fasteners, insulating set, and sealant. The flush-bottom seal pocket shall be set to provide a flush fluidway surface.
- G. Gate Stem and Guides:
 - 1. Existing gate stems and guides shall be re-used.
 - 2. Make adjustments to guides as necessary for a properly-functioning gate.
 - 3. Make adjustments to the stem as necessary to accept the new gates.
 - 4. Check stem guide fasteners for condition and tightness and secure as necessary.
 - 5. When installing the gate, use caution when inserting the stem through the stem guides to prevent damage to the guides.
 - 6. Connect the existing gate stem to the slide gate slide with the existing bronze stem nut provided and secure.
- H. Perform all necessary hydraulic and electrical connections to operate the slide gates.

3.03 FIELD LEAK TEST

- A. The CONTRACTOR shall perform and pass a leak test on both Gates 5 and 6 prior to the Final Acceptance Testing.
- B. Measure the leakage through the gate (including through the frame-to-thimble connection) and demonstrate the leakage is less than the allowable.
- C. Total slide gate leakage between leaf and seats/seals/sill to be a maximum of 0.10 gallon per minute per lineal foot of seal perimeter per AWWA C561.
- D. Leakage between seats and frame: none allowed.
- E. The CONTRACTOR shall select (or design) and use a flow measurement apparatus and submit the flow measurement approach in the Field Leak Test Plan for review and acceptance in advanced of performing the test. Submit the Field Leak Test Plan in accordance with Specification Section 01 33 00, Submittal Procedures.

- F. Results of the Field Leak Test shall be submitted and documented in a Field Leak Test Report. The report shall include dates of testing, test equipment used, person(s) performing the test, test results, and corrections or adjustments made (if any).

3.04 FIELD OPERATIONAL TESTING

- A. With slide Gates 5 and 6 installed, and with the HPU installed and ready for service, the contractor shall perform Field Operational Testing of all installed equipment, controls, alarms and appurtenances prior to the Final Acceptance Testing.
- B. This is written as a Field Operational Test for Slide Gate Nos. 5 and 6 but section 41 24 26 (Hydraulic Power Unit) includes additional operational testing of the HPU for gate nos. 1 through 6.
- C. Manufacturer's representatives. The CONTRACTOR shall contract with and pay for the services of the following manufacturer's representatives to be present for Operational Testing, to assist with equipment and control adjustments and bringing the system into service, and to furnish final equipment adjustment and testing reports:
 - 1. Hydro Gate (slide gates manufacturer).
 - 2. Womack or approved HPU manufacturer (hydraulic power unit manufacturer).
- D. Operational Testing shall be performed by the CONTRACTOR in the presence of the ENGINEER. CONTRACTOR shall provide at their expense all equipment, utilities, expendables and labor required to perform the testing.
- E. Gate 3 side seal replacement shall be completed before any gate wet testing.
- F. The CONTRACTOR shall prepare and submit a Field Operational Test Plan for review and acceptance prior to scheduling the Operational Testing. The Field Operational Test Plan shall fully document all proposed procedures, testing, and testing equipment to be utilized to demonstrate proper installation, operational and control of the station and its equipment. The Field Operational Test Plan shall clearly document testing of all control systems in manual and automatic operational modes, including alarm functions, control signals and any signal simulation required.
- G. Schedule Operational Testing of individual components, groups of components or systems with the OWNER at least thirty (30) days in advance of such testing. To the maximum extent possible, all Operational Testing shall be performed over consecutive work days and coordinated with Operational Testing of Specification Section 41 24 26, Hydraulic Power Unit.
- H. Minimum Operational Testing with the bulkhead in place and the slide gates unwatered:
 - 1. Operate Gates 5 and 6 individually from closed to 10 % open and then close in local control mode.
 - 2. If operation is satisfactory, open to 50 % open, then close in local control mode.
 - 3. If operation is satisfactory, operate Gates 5 and 6 individually through full stroke twice in local control mode.

4. If operation is satisfactory, operate Gates 5 and 6 individually through full stroke twice in remote control mode.
- I. Partial Head Operational Test
1. With the bulkheads in place and Slide Gate Nos. 5 and 6 closed, fill the space between the bulkheads and Slide Gates 5 and 6 with reservoir water, equal to the reservoir elevation for balance head conditions. Open Slide Gates 1 through 4.
 2. Open Gate 5, from the fully closed position to the 10 % open and back to the fully-closed position under full head (normal pool) in local control mode. Monitor and record hydraulic pressures at the HPU and hydraulic cylinders, and the amperage required. The water will drain quickly.
 3. Repeat the test for Slide Gate 6.
 4. Repeat the tests for Slide Gate Nos 5 and 6 to 50 % open.
- J. Full Head Operational Test
1. This test will demonstrate the capability to open Slide Gates 5 and 6 unbalanced and close the slide gates in an emergency.
 2. With Slide Gates 5 and 6 closed, the bulkheads removed, and with the reservoir elevation available, open Slide Gates 1 through 4 to 10% while dewatered. Measure and record all hydraulic pressure parameters and amperage required for each test.
 3. Test operate Slide Gate 5 as follows:
 - a. Open the slide gate to 10 %, and then close in local control mode.
 - b. Open the slide gate to 20 % and then close in local control mode.
 - c. Open the slide gate to 100 % and then close in remote control mode.
 - d. Repeat these tests for Slide Gate 6.
- K. Upon completion of Field Operational Tests, the CONTRACTOR shall make all final adjustments, repairs and replacements as required to comply with the PROJECT Documents and retest all components to demonstrate such.
- L. Results of Field Operational Testing shall be submitted and fully documented in an Operational Testing and Final Adjustment Report. The report shall include dates of testing, test equipment utilized, person performing tests and ENGINEER witness, tests made, specified or manufacturer provided comparative acceptable test results, reservoir elevation at time of test, actual test results including maximum hydraulic system operating pressures for each test and any observations, noises, or vibrations, corrections made and results of retesting for each piece of equipment of component tested.
- M. The CONTRACTOR shall provide written certification that the Operational Testing was satisfactorily completed, all deficiencies were corrected, initially deficient components were successfully retested and that the equipment is ready for Final Acceptance Testing.

3.05 FINAL CLEANING AND PASSIVATION

- A. Areas with evidence of contamination, disruption of the passive film and/or surface oxidation shall be properly cleaned and treated at no additional cost to the project in accordance with ASTM A380/A967 and ASTM Special Technical Publication 538.
- B. For field cleaning and passivation of stainless steel items, see the stainless steel field cleaning and passivation notes on the Drawings.
- C. This section applies to existing stainless steel components handled and/or compromised in the course of the PROJECT.

3.06 FIELD QUALITY CONTROL

- A. System Performance Evaluation:
 - 1. General Commissioning Requirements:
 - a. Provide 2 days of field service during initial operation.
 - b. Provide 1 day of field service during final performance testing.
- B. Manufacturer's Field Services:
 - 1. Demonstration and Training:
 - a. Provide 1 day of OWNER (operator) training for the slide gate.

3.07 FINAL ACCEPTANCE TESTING

- A. See Specification Section 41 24 26 – Hydraulic Power Unit.

END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

SECTION 41 24 26
HYDRAULIC POWER UNIT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Removal of existing hydraulic power unit (HPU). See Specification 02 41 00, Demolition.
2. Performance requirements for a replacement (HPU) and associated control panel. See also Specification Section 25 00 40 – Programmable Logic Controllers.
3. PLC Panel and PLC shall be provided per Division 25 requirements, and as stated herein this specification.
4. Factory Acceptance Testing.
5. Installation of new HPU into existing system (piping and cylinders).
6. Flushing and venting of existing hydraulic lines and cylinders.
7. Field Operational Testing.
8. Final Acceptance Testing.
9. Demonstration and Training.

B. Related Sections:

1. Section 01 33 00 – Submittal Procedures
2. Section 01 75 00 – Starting and Adjusting
3. Section 02 41 00 – Demolition
4. Section 05 50 00 – Metal Fabrication
5. Section 25 00 05 – Common Work Results for PMCS
6. Section 25 00 40 – Programmable Logic Controllers
7. Section 25 00 60 – Process Control Panels and Hardware
8. Section 35 22 26 – Slide Gates

1.02 REFERENCES

- A. The publications are referred to in the text by basic designation only. The latest edition available on the date of Notice Inviting Bids shall be used.

B. Reference Standards:

1. American Society of Mechanical Engineers (ASME)/ American National Standards Institute (ANSI)
 - a. ASME/ANSI B31.1 (2010) Code for Pressure Piping
2. American Society of Testing and Materials (ASTM):
 - a. ASTM A240/A240M-20 Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plates, Sheet, and Strip for Pressure Vessels and for General Applications
 - b. ASTM A269/A269M-15a(2019) Standard Specification for Seamless and Welded Stainless Steel Tubing for General Service

- c. ASTM A276/A276M-17 Standard Specification for Stainless Steel Bars and Shapes
- d. ASTM A312/A312M-19 Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless-Steel Pipe
- e. ASTM A380-17 – Standard Practice for Cleaning, Descaling, and Passivation of Stainless-Steel Parts, Equipment, and Systems
- f. ASTM F593-17 Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
- g. ASTM F594-09(2020) Standard Specification for Stainless Steel Nuts
- 3. American Welding Society (AWS)
 - a. ANSI/AWS D1.6/D1.6M – Structural Welding Code – Stainless Steel
- 4. International Organization for Standardization:
 - a. ISO 4406:2017 Hydraulic Fluid Power – Fluids – Methods for Coding the Level of Contamination by Solids Particles.
- 5. National Electrical Manufacturer’s Association (NEMA):
 - a. NEMA ICS 2-2000 Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated 600 Volts
 - b. NEMA KS 1-2001(R2006) Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum)
 - c. NEMA 5-2000 Industrial Control and Systems: Control Circuit and Pilot Devices
 - d. NEMA 250-2003 Enclosures for Electrical Equipment (1000 Volts Maximum)
 - e. NEMA MG 1-2003 Motors and Generators
- 6. National Fluid Power Association (NFPA):
 - a. NFPA T3.5.1 R2-2002 Hydraulic fluid power - Valves - Mounting surfaces.
- 7. National Fire Protection Association, Inc. (NFPA):
 - a. NFPA 70-2011 National Electrical Code (NEC).
- 8. Society for Protective Coatings (SSPC):
 - a. Standards as specified herein.

1.03 SYSTEM DESCRIPTION

A. HPU to operate the following gate and cylinder schedule:

Gate Schedule

Gate No.	Gate Material	Gate Size (W x H) (in.)	Seat Material	Normal/Max Head at gate centerline (feet)	Outer/Inner Hydraulic Piping Diameter (in.)	Cylinder Bore/Rod/Stroke (in.)	Operating Speed (in. per minute)
1	Stainless Steel (Exist.)	48x54	UHMW	64/69.5	0.375/0.277	5.0/2.0/62	12 (+/- 4)
2	Stainless Steel (Exist.)	48x54	UHMW	64/69.5	0.375/0.277	5.0/2.0/62	12 (+/- 4)
3	Stainless Steel (Exist.)	48x54	UHMW	64/69.5	0.375/0.277	5.0/2.0/62	12 (+/- 4)

4	Stainless Steel (Exist.)	24x24	UHMW	64/69.5	0.375/0.277	2.5/1.38/33	6 (+/- 2)
5	316 Stainless Steel (New)	84x96	UHMW	37/42.5	0.5/0.37	7.0/3.0/116	12 (+/- 4)
6	316 Stainless Steel (New)	84x96	UHMW	49/54.5	0.5/0.37	8.0/3.5/116	12 (+/- 4)

B. Hydraulic Power Unit Operation

1. The HPU and electrical controls shall be designed to operate the slide gates so that, on closing, when the slide gates are fully closed, the hydraulic system pressure rises and actuates a pressure switch set at 1,400 psi to shut off the system.
2. The HPU and electrical controls shall be designed to operate the slide gates so that, on opening, when the slide gates reach the fully-open position, the position transducers on the hydraulic cylinders shall be set to shut off the system. Note that the slide gates have some overtravel beyond the fully-open position, so that the travel for Gates 1, 2, and 3 is 54 inches, for gate 4 the travel is 24 inches, and for gates 5 and 6, the travel is 96 inches.
3. The HPU and electrical controls shall be designed to operate the slide gates so that, on opening, if the system pressure activates the pressure switch (as sensed by the opening pressure switch) before the gate is fully open then the hydraulic system shuts off.
4. Slide gates 5 and 6 will be normally operated in the open position, and gates 1, 2, 3, and 4 will be used for throttling flow.

1.04 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures, the requirements of the General Provisions and all Supplementary General Provisions.
- B. Submit Shop Drawings and data for the design and manufacture of the new HPU, prior to fabrication. The submittal data shall include:
 1. Catalog data and drawings for the electric motors, hydraulic oil pumps, filters, hydraulic oil product data, control valves, oil reservoir, line sizes and appurtenances for a complete installation, including hydraulic and electrical schematic and logic diagrams and lists of materials.
 2. Drawings for the HPU shall include overall layout with critical dimensions and showing the general arrangement of components.
 3. Details for anchorage to the reinforced concrete equipment deck.
 4. Calculations, signed by a Professional Engineer licensed in the State of Texas in good standing, indicating suitability of the HPU including but not limited to pump flow rating curves, pump capacities, pressure losses, and operating parameters (e.g. oil temperatures, viscosities, etc.).
 5. Submit PLC panel per Division 25 requirements.
- C. Quality Assurance Submittal:
 1. HPU Manufacturer Qualifications.

- a. Within 30 days after contract award.
- D. Quality Control Submittal:
 - 1. HPU Factory Test Plan and schedule.
 - 2. HPU Factory Test Report.
 - 3. Field Operation Test Plan and schedule.
 - 4. Field Operation Test Report.
 - 5. Final Acceptance Testing Plan.
 - 6. Final Acceptance Testing weekly status reports.
 - 7. Final Acceptance Testing Report.
- E. Closeout Submittal:
 - 1. Operation and Maintenance Manuals: The manuals shall include all previously approved drawings and data, HPU as-built drawings, and operation and maintenance instructions for the HPU, hydraulic cylinders, and appurtenances.
 - 2. HPU Manufacturer Warranty.
 - 3. Spare parts.
- F. See also Specification Section 01 78 00 – Closeout Submittals.

1.05 QUALITY ASSURANCE

- A. The hydraulic power unit shall be furnished by a manufacturer that meets the following minimum requirements:
 - 1. At least 15 years' experience in the design and fabrication of items of equipment of similar size, complexity, and operating pressure.
 - 2. Manufacturing facility and processes are ISO Certified and in good standing.
 - 3. Ability to service the area of installation within a 24-hour time period after notification.
 - 4. Submit HPU manufacturer qualifications within 30 days after contract award.
- B. The CONTRACTOR shall have the following minimum requirements:
 - 1. At least five (5) successful installations of hydraulic power units in the last 10 years.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. The CONTRACTOR is responsible for delivering the HPU and all supporting equipment to the project site.
- B. The CONTRACTOR is responsible for unloading the HPU, storage and handling.
- C. Store the HPU and accessories above the ground surface on platforms, skids, blocking, or other supports.
- D. Locate and provide protection from conditions that produce oxidation and contamination.
- E. Handle and store to prevent contamination, to prevent compromising the stainless-steel passive film and so no parts are bent, broken, or otherwise damaged, and avoid damage to other material and work.

1.07 WARRANTY

- A. The HPU manufacturer to provide a 24-month warranty for the manufactured unit and control panel.
- B. The CONTRACTOR shall provide a minimum two (2) year warranty for all equipment and WORK supplied under this specification. The warranty period shall begin from the date of Final Completion. Any defects of design, workmanship, or materials, that would result in non-compliance with the Contract specifications, shall be fully corrected by the CONTRACTOR (including parts and labor) at no additional cost.

PART 2 PRODUCTS

2.01 NEW HYDRAULIC POWER UNIT

- A. General
 - 1. The existing slide gate hydraulic power unit (HPU), including motors, pumps, control valves, oil reservoir, Kleenvent breather filter unit, and appurtenances shall be removed from the Equipment Shed and the area prepared for installation of the new HPU and piping. The power unit and removed items shall be lawfully recycled and/or disposed of (see also Specification Section 02 41 00 – Demolition).
 - 2. One new HPU shall be designed to integrate with the existing remaining system to operate the six existing hydraulically-operated slide gates with double-acting hydraulic cylinders. The hydraulic control system shall include the HPU, all necessary internal fluid line piping, all necessary valves, supports, and all necessary electrical equipment for local and remote operation/monitoring.
 - 3. The HPU shall be furnished with three hydraulic pump/electric motor units. Two large pump/motors shall be used to operate Gates 5 and 6 at approximately 12 inches per minute (with no flow control valves), and one large pump/motor unit will be used to operate Gates 1, 2, and 3 (with no flow control valves) at approximately 12 inches per minute (with no flow control valves). One small pump/motor unit shall be furnished to operate Gate 4 at approximately 6 inches per minute (with no flow control valves).
 - 4. The general arrangement of the new HPU shall be similar to the existing power unit, so that there will be no major changes required for installation, electrical connections, and connection to the existing hydraulic cylinder tubing. The existing power unit will be available for examination and necessary dimensions and data.
 - 5. The Hydraulic Schematic for the existing HPU is available for additional information concerning internal components and arrangements.
 - 6. The new HPU shall be installed in the existing Equipment Shed in accordance with Article 3.03B and generally as shown on the Drawings. Any upgrades or modifications to the Equipment Shed (if any) are the CONTRACTOR's responsibility at no additional cost to the contract price and shall be submitted for approval prior to making significant modifications.

B. Performance Criteria

1. The HPU shall be an integrated, self-contained unit, complete with a type 316 or 316L stainless-steel frame, type 316 or 316L stainless-steel oil reservoir, electric motors, hydraulic pumps, filters, solenoid-operated directional valves, relief valves, counterbalance valves, pressure switch, pressure gauge, shutoff valves, and necessary electrical equipment.
2. The HPU shall be designed so that hydraulic losses in the HPU and hydraulic lines do not exceed 500 psi at maximum design pump flow.
3. The oil reservoir shall be designed and fabricated in accordance with National Fluid Power Association (NFPA) Standards. The capacity of the oil reservoir for the hydraulic pumping unit should be 3 times the fluid displaced in one minute with both large pumps operating, plus the total gate stem displacement, plus 10 %, plus three (3) inches above the top of maximum oil level. The oil reservoir and any internal piping shall be fabricated from stainless-steel, type 316 or 316L. The oil reservoir shall include a drain, access for inspection and cleaning, a filter breather assembly with a desiccant filter, and an oil level sight gauge and temperature gauge. The oil reservoir shall be located above the pumps and control components for positive feed to the pumps. The desiccant filter system shall be sized appropriately for the HPU and include: a check valve so expelled air does not route through the filter (i.e. expelling air directly to the atmosphere); a filter condition indicator; and replaceable cartridges. Provide three (3) spare desiccant filter cartridges.
4. Provide a drip pan under the HPU of suitable size and capacity for containing any leaks and spills and include a drain plug on the front or side for cleaning.
5. Three oil pumps shall be provided. Each of the two large pumps shall be capable of providing one-half the volume required for Gates 5 and 6. One of the large pumps shall be used for Gate 1, 2, and 3. One small pump shall be provided for Gate 4. The oil pumps shall be rotary, positive displacement type, meeting the pressure and flow condition requirements stated above, and suitable for operation with the hydraulic oil specified. The oil pumps shall be furnished with suitable flanges for attaching to the electric motors and coupling guards shall be provided if flexible couplings are installed. The oil pumps shall be provided with suitable shaft bearings and seals to prevent leakage and shall operate at a standard 1,200 RPM rate (for quitter operation and longer lifespan) or other approved standard rate.
6. The electric motors shall be totally enclosed, and fan cooled, providing the necessary power to operate the hydraulic pumps at the maximum pressure required, without exceeding the nameplate rating and without the benefit of service factor. The maximum temperature rise of the windings shall not exceed 80 degrees C by resistance, for Class B, F, or H insulation, when the motor is delivering rated output continuously at rated voltage and frequency. The temperature rise of other parts shall be in accordance with standards for Class B insulation. The motors shall operate at 460 volt, three-phase, 60 Hertz current, at an altitude of 700 feet, at a standard speed of 1,200 RPM (or approved alternate), and a temperature range of 0 to 140 degrees F. The two large electric motors, when operating Gates 5 and 6, shall be connected so that one motor starts 5

- seconds after the other to reduce inrush current. The hydraulic system should function on one motor if one pump or motor fails.
7. Six three-position solenoid-operated four-way directional control valves shall be provided to control oil flow to the six slide gates. The directional valves shall be manufactured so that flows through the valves may be reversed, and pressure directed to either of two outlets by energizing proper solenoids. The valves shall be double solenoid operated, spring-centered, with manual pushpins. With both solenoids de-energized and the directional valves centered, the pressure port shall be blocked, and the cylinder ports are open to the oil reservoir. Each directional valve shall have the flow capacity of not less than the maximum combined output of the two large oil pumps and shall have a minimum pressure rating of 3,000 psi. The solenoids shall be rated at 120 volts, single phase, 60 Hertz.
 8. Provide two pressure switches to control stopping of the oil pump motors.
 - a. Closing pressure switch: The closing pressure switch shall be initially set to actuate at 1,400 psi during gate closure, to stop the oil pump motors, with a maximum pressure rating of 3,000 psi. The pressure switch shall use a stainless-steel Bourdon tube, with a calibrated dial and external adjustments.
 - b. Opening pressure switch: The opening pressure switch shall be initially set to actuate at 2,350 psi during gate opening, to stop the oil pump motors, with a maximum pressure rating of 3,000 psi. The pressure switch shall use a stainless-steel Bourdon tube, with a calibrated dial and external adjustments. This pressure switch is included as a safety system shutdown.
 9. Two system relief valves or a cross-over relief valve shall be provided. The relief valves shall be pilot type with an internal drain. The relief valve shall be set initially at 1,600 psi for the closing cycle, and 2,500 psi for the opening cycle, and have a maximum pressure rating of 3,000 psi, with an adjustable range of 500 to 3,000 psi. The flow capacity shall be not less than the maximum combined flow capacity of the two large oil pumps. Operating selection of the relief valve shall be accomplished by solenoid control for the desired gate operation.
 10. Pilot-operated counterbalance valves shall be provided to control the rate of closure of the slide gates. The counterbalance valves shall allow free flow in the gate opening direction, but control return flow in the closing direction. The valves shall be rated at 3,000 psi, with an adjustable range of 500 to 2,800 psi, shall have a maximum leakage rate of 5 drops per minute when seated, and shall have a flow capacity of at least the maximum combined flow of the two large oil pumps.
 11. One two-way, solenoid operated, poppet-type shutoff valve shall be provided in the pressure line from each pump (to allow each pump to start with no load and to drain down the system pressure when de-energized), and then close approximately 10 seconds after first pump start-up. The shutoff valve shall be spring offset, energize to close, with a pressure rating of at least 3,000 psi, and a flow capacity of at least the maximum output flow of the oil pump it bypasses. The solenoid shall be rated at 120 volts, single phase, 60 Hertz.

Note: If a crossover relief valve is used in paragraph 9 above, a controlling three-position four-way valve may be selected having a center position with pressure

port connected to tank and both A and B ports blocked. In this case, the four-way valve, when de-energized, will act as an unloading valve for the pumps and to drain down the system pressure when de-energized and the appropriate solenoid energized 10 seconds after first pump start-up. Both the crossover relief valve and the controlling four-way valve shall have a flow capacity of at least the maximum combined flow of the two large oil pumps.

12. A pressure gauge shall be provided on the pump discharge line common to the pumps as well as on each of the twelve (12) cylinder lines (rod and cap end connections for each of the five cylinders). The pressure gauges shall be 4-inch diameter, 0 to 4,000 psi, with stainless-steel Bourdon tube operation. The gauges shall withstand an overpressure of 150 % of the system pressure (maximum opening relief valve setting) and have an accuracy of 0.25 % over the entire scale. The housing shall be stainless-steel or polycarbonate, with a clear acrylic cover.
13. The suction filter shall be a replaceable filter-element type, with one corrosion resistant, 200-mesh wire cloth element. The filter capacity shall be 1.5 times the rated output of the combined capacity of the two large oil pumps and shall filter all the oil passing through the suction line. An automatic bypass shall limit the pressure drop to less than 2 psi, during cold startup or as a result of contamination buildup. A visual indicator shall indicate when servicing is required. Provide three (3) spare elements. Mount suction filters in the HPU so that element removal may be performed easily from the front or side without interference from other components or frame members.
14. The pressure filter shall be a replaceable filter-element type, capable of removing 99.5 % of particles as small as 5 microns. The filter shall be rated at 3,000 psi, with a capacity of at least the maximum combined output of the two large oil pumps. The filter shall filter all the oil passing through the line. Provide the filter with an integral pressure actuated bypass valve connected in parallel with the full-flow filter element to limit the pressure drop to 50 psi, either during cold start up or as a result of contamination. A visual indicator shall indicate when servicing is required. The filter shall be a double element type, with six (6) spare filter elements. Mount pressure filter readily accessible in the HPU for maintenance so that element removal may be performed easily from the front or side without interference from other components or frame members.
15. Provide oil level and temperature indicators (both optical and digital) with communication feed to the control panel for remote monitoring.
16. Provide a thermostatically-controlled heater in the oil reservoir with an ON/OFF switch for winter operation.
17. Provide a control panel integral with the HPU with six (6) sets of pushbuttons (one set for each gate), six (6) gate position panel meters (one for each gate), a LOW OIL warning light, a LOW OIL SHUTDOWN light, EXCESSIVE RUN TIME light, a RESET pushbutton, and a heater ON/Off switch. Oil pressure gauges shall be located to be visible by an operator standing before the control panel. Each pushbutton set shall include an OPEN, CLOSE, and STOP pushbutton, connected so that constant pressure on the desired pushbutton is not required.

- a. Control Panel shall include a PLC to provide the same functionality and control as the original to be replaced; refer to Division 25 specifications. CONTRACTOR shall furnish and install as a package to control and monitor the HPU and slide gates and provide communications to the current HMI.
18. Provide ball-type shutoff valves at the cylinder line connections at the exterior of the unit, as well as internal locations for isolating filters and other hydraulic components as required. The ball valves shall be rated at 3,000 psi, with stainless-steel bodies, and, Acetal resin or Buna N seals and a hard chrome-plated steel ball.
19. Provide a digital pressure transducer located between the pump(s) and manifold block with digital or analog readout at the HPU and communication feed to the control panel for remote monitoring.
20. An auxiliary manually-operated hydraulic pump shall be furnished, with suitable valves and connecting piping. The manually operated pump shall be a two-speed, dual pressure pump that automatically shifts from the low-pressure high-volume pump to the high-pressure low-volume pump at 300 psi or more. The operating effort at maximum pressure shall not exceed 40 pounds.
21. Provide any other hydraulic/electric components to furnish a complete HPU capable of operating the slide gates as specified.

C. Fabrication Criteria

1. Metal fabrication shall be in accordance with relevant sections of Specification Section 05 50 00 – Metal Fabrication.
2. The HPU shall be fabricated and assembled into a complete, self-contained unit. All electrical wiring to HPU components shall be installed, to connect to terminals in the single electrical enclosure mounted on the HPU. Suitable terminals shall be furnished for connection to the on-site electrical system.
3. The completed HPU shall be close in size to the existing hydraulic power unit, to the extent possible capable of fitting within the existing Equipment Shed with sufficient space to accommodate related equipment, operation and room for maintenance.
4. The HPU shall be designed to be anchored to the floor.
5. The HPU shall have a neat appearance with all sharp edges, corners, welds, and other surface irregularities ground smooth.
6. The hydraulic components on the HPU shall be connected with stainless-steel hydraulic fluid line tubing of suitable diameter and wall thickness. The directional valves, relief valve, two-way shutoff valve, flow control valve, and counter-balance valves shall be subplate or stack mounted for removal and installation without disturbing the connecting piping. All internal piping shall be sized for maximum oil velocity of 14 feet per second in pressure lines, and 4 feet per second oil velocity in suction lines. The piping shall have a wall thickness that provides a 6 to 1 factor of safety, based on burst pressure.
7. Provide laminated plastic or anodized aluminum identification nameplates for each adjustable or major hydraulic valve or device in the HPU. Each nameplate shall include component name and any identification number shown on the approved hydraulic schematic diagram. Plastic nameplates may be used only if securely mounted near the referenced component in a manner that prevents

accidental snagging or breaking. Mount nameplates securely to as broad a surface as possible so that if at all possible, corners of the nameplate do not protrude.

D. Surface Preparation

1. Stainless steel shall be prepared and passivated before shipping in accordance with ASTM A380.

E. Acceptable HPU Manufacturer:

1. Womack Machine Supply Company
13835 Senlac Drive
Famers Branch, TX 75234
(800) 569-9801
<http://www.womackmachine.com>
2. Or approved equal.

2.02 HYDRAULIC OIL

- A. Hydraulic oil for the shop testing and installation of the new HPU shall be new oil, synthetic polyolester (POE), fire-resistant, biodegradable (determined by the OECD 301C test method).

2.03 PAINT, PROTECTIVE FINISHES, AND MARKING

- A. Do not paint stainless-steel surfaces.
- B. HPU markings shall include a nameplate listing the manufacturer, class, size, and year of manufacture.
- C. Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels, or name, identification, performance rating, or nomenclature plates on equipment.
- D. Do not paint operating parts unless approved by the equipment manufacturer and supplier.
- E. Do not paint operating parts if painting will void or diminish the equipment warranty or system warranty.
- F. Metallic non-stainless-steel and non-aluminum hydraulic and electrical components within the HPU enclosure shall be painted with the manufacturer's standard coating.
- G. Any coatings (including galvanized components) damaged during installation shall be repaired.
- a. Lubricants shall be removed in accordance with SP 1 and paint manufacturer.
 - b. Rust shall be removed in accordance with SP -11.
 - c. The touch-up material shall be compatible with, the same color and from the same manufacturer as the coating system being repaired.

- d. Subsequent coatings shall be applied within the recoat time and repair procedure recommended by the manufacturer.

2.04 SHIPPING

- A. Drain the hydraulic oil reservoir and secure moveable components to prevent loss or damage by vibration or rough handling.
- B. Cap or plug the HPU piping and components to prevent the entrance of dirt or moisture.
- C. The HPU shall be stored indoors both prior to shipping and on-site prior to installation.
- D. All parts of the power unit shall be crated, wrapped or otherwise protected from damage during shipment.
- E. Deliver equipment and materials specified under this Section to the De Cordova Bend Dam PROJECT site.

PART 3 EXECUTION

3.01 EXAMINATION

- A. The CONTRACTOR shall check and verify all field conditions and dimensions of items related to the design and fabrication of the HPU prior to design and shop drawing preparations.

3.02 SHOP TESTING

- A. The ENGINEER and/or OWNER shall have free entry at all times while tests are being conducted to ascertain that materials being furnished are in accordance with the Contract Documents. The CONTRACTOR shall notify the ENGINEER a minimum of 30 days in advance of shop tests so that the tests may be witnessed, unless waived.
- B. The HPU shall be tested in the shop to demonstrate that it delivers the required quantity of oil at the specified pressure. The relief valve shall be adjusted to maintain the specified pressure during testing. The HPU shall be operated during testing to demonstrate that all the hydraulic and electrical components are properly adjusted and function accordingly. Discharge from the hydraulic pumps shall be measured individually and combined for a minimum of 1 minute for each case. Any observed leakage in the piping or components shall be repaired and the unit retested.

3.03 HYDRAULIC POWER UNIT INSTALLATION

- A. General

1. The HPU installation shall include placement of the HPU in the Equipment Shed, flushing and venting the hydraulic lines, making connections to the existing hydraulic cylinder fluid lines, and test operation of the slide gates.
- B. The HPU shall be installed in the Equipment Shed in the same location and orientation as the existing unit, as generally shown on the Drawings.
 1. Locate within the existing Equipment Shed with sufficient space to accommodate related equipment, operation, and room for maintenance.
 2. The HPU shall sit 2-inches off the deck slab, be level and securely anchored to the concrete deck slab using a minimum of four (4) 316 stainless-steel anchors (see Specification Section 05 05 19 – Post-Installed Concrete Anchors).
 3. Neoprene washers and sleeves shall be used to protect against galvanic corrosion between the stainless-steel anchors and any carbon steel components (if any).
 4. A dry-pack non-shrink grout leveling pad shall be used.
- C. The oil reservoir shall be cleaned prior to filling with oil.
- D. Drain the oil from the hydraulic cylinders and disconnect the hydraulic fluid lines.
- E. With the hydraulic lines disconnected to the HPU and hydraulic cylinders, flush the lines using a temporary hydraulic pump and new, clean hydraulic oil. The temporary hydraulic pump shall produce enough velocity in the hydraulic lines to provide a minimum Reynolds number of 4,000, for removal of debris. The temporary system filters shall be observed during the flushing operation, and the flushing shall continue until the filter elements remain clean.
- F. The hydraulic cylinders shall be flushed and filled with new, clean hydraulic oil.
- G. All flushing shall remove all debris from the system and achieve or exceed an oil cleanliness of 18/16/13 (based on ISO 4406:2017 or the most recent version).
- H. When flushing is complete, reconnect the hydraulic fluid lines to the hydraulic cylinders and connect the fluid lines to the new HPU.
- I. All electrical connections to the HPU control panel and appurtenances shall be performed.
- J. The hydraulic control system, including the oil reservoir, hydraulic lines, and hydraulic cylinders shall be filled with new, clean hydraulic oil which has been filtered to achieve or exceed an oil cleanliness of 18/16/13 (based on ISO 4406:2017 or the most recent version). The hydraulic oil shall be the reviewed and approved product (see Article 2.02 HYDRAULIC OIL); no substitutes.
- K. Vent all air from the system while maintaining the proper fluid level in the oil reservoir. When air venting is complete, open all ball valves at the HPU and hydraulic cylinders.

3.04 FIELD OPERATIONAL TESTING

- A. With slide Gates 5 and 6 and the HPU installed and ready for service, the CONTRACTOR shall perform Field Operational Testing of all installed equipment, controls, alarms and appurtenances prior to the Final Acceptance Testing. Coordinate testing of the HPU with Field Operational Testing of new slide gate nos. 5 and 6 under Section 35 22 26 – Slide Gates.
- B. Pressure gauges, similar to those supplied with the HPU, shall be installed at each hydraulic cylinder bleed valve connection (top connections), to provide pressure readings during testing.
- C. Operational Testing shall be performed by the CONTRACTOR in the presence of the ENGINEER. CONTRACTOR shall provide at their expense all equipment, utilities, expendables and labor required to perform the testing.
- D. Gate No. 3 side seal replacement shall be completed before any gate wet testing.
- E. The CONTRACTOR shall prepare and submit a Field Operational Test Plan for review and acceptance prior to scheduling the Operational Testing. The Field Operational Test Plan shall fully document all proposed procedures, testing, and testing equipment to be utilized to demonstrate proper installation, operational and control of the station and its equipment. The Field Operational Test Plan shall clearly document testing of all control systems in manual and automatic operational modes, including alarm functions, control signals and any signal simulation required.
- F. Schedule Operational Testing of individual components, groups of components or systems with the ENGINEER at least thirty (30) days in advance of such testing. To the maximum extent possible, all Operational Testing shall be performed over consecutive work days and coordinated with Operational Testing of Specification Section 35 22 26 – Slide Gates.
- G. With the bulkheads in place and the slide gates unwatered, the following test procedure shall be followed for Slide Gate No. 1:
 - 1. Open the slide gate 1 to 10 % open and then close in local control mode.
 - 2. If operation is satisfactory, open to 50 % open, then close in local control mode.
 - 3. If operation is satisfactory, operate the gate through full stroke twice in local control mode.
 - 4. If operation is satisfactory, operate the gate through full stroke twice in remote control mode.
 - 5. Monitor and record the oil pressure at the HPU and individual hydraulic cylinders, and the amperage required during gate operation. Observe the gate position indicator for proper calibration.
- H. Repeat the above test procedure for Slide Gates 2 through 6.
- I. Partial Head Operational Test for Gates 5 and 6.

1. With the bulkheads in place, fill the space between the bulkheads and Slide Gates 5 and 6 with reservoir water, equal to the reservoir elevation for balance head conditions. Open Slide Gates 1 through 4 to 10% open.
 2. Open Gate 5 to 100% then immediately close, while measuring and recording the hydraulic pressure at the HPU and hydraulic cylinders, and the amperage required. The water will drain quickly.
 3. Repeat the test for Slide Gate 6.
- J. Full Head Operational Tests
1. This test will demonstrate the capability to open Slide Gates 5 and 6 unbalanced and close the slide gates in an emergency
 2. With the bulkheads removed and with the reservoir elevation available, and with Slide Gates 5 and 6 closed, open Slide Gates 1 through 4 to 10% open while dewatered. Measure and record all hydraulic pressure parameters and amperage required.
 3. Test operate Slide Gate 5 as follows:
 - a. Open the slide gate 10 %, and then close in local control mode.
 - b. Open the slide gate to 20 % and then close in local control mode.
 - c. Open the slide gate to 20 % and then close in remote control mode.
 - d. Repeat these tests for Slide Gate 6.
 4. For Slide Gates 1 through 4, start with Slide Gates 1 through 4 closed and Slide Gates 5 and 6 100% open.
 5. Test operate Slide Gates 1 through 4 in the same sequence as used for Slide Gates 5 and 6, measuring and recording the same parameters.
- K. Upon completion of Field Operational Tests, the CONTRACTOR shall make all final adjustments, repairs and replacements as required to comply with the PROJECT Documents (including Gate No. 3 side seal replacement/repair) and retest all components to demonstrate such.
- L. Results of Field Operational Testing shall be fully documented in an Operational Testing and Final Adjustment Report. The report shall include dates of testing, test equipment utilized, person performing tests and ENGINEER witness, tests made, specified or manufacturer provided comparative acceptable test results, reservoir elevation at time of test, actual test results including maximum hydraulic system operating pressures for each test and any observations, noises, or vibrations, corrections made and results of retesting for each piece of equipment of component tested.
- M. The CONTRACTOR shall provide written certification that the Operational Testing was satisfactorily completed, all deficiencies were corrected, initially deficient components were successfully retested and that the Station is ready for Final Acceptance Testing.

3.05 FIELD QUALITY CONTROL

- A. Field Service Representatives from Hydro Gate (the slide gate manufacturer) and the HPU manufacturer shall be present during critical phases of the installation and during Slide Gate and Hydraulic Power Unit Field Testing and Training.

3.06 FINAL ACCEPTANCE TESTING

- A. The CONTRACTOR shall perform Final Acceptance Testing of all the equipment, controls, alarms and appurtenances.
- B. During Final Acceptance Testing the CONTRACTOR shall demonstrate proper repair of any items found deficient during the field testing (Field Leak Test and Field Operational Testing).
- C. Final Acceptance Testing shall be executed with the stop logs removed and the gates fully operational.
- D. Final Acceptance Testing shall consist of the successful operation of the equipment for a period of 30 consecutive calendar days after the gate assembly and all associated equipment are operating within design parameters pursuant to the technical specifications and approved submittals.
- E. Unless directed otherwise by the ENGINEER, the Final Acceptance Testing shall consist of the following minimum requirements:
 - 1. Gates 5 and 6 in the full open position.
 - 2. Gate operations shall be during normal business hours.
 - 3. Gates 1 through 4 operated twice daily (Monday through Friday) to a position approved by the ENGINEER. Gates 1 through 4 shall be closed overnight and over the weekends unless otherwise approved by the ENGINEER.
 - 4. Gates 1 through 4 operating positions and water release durations are subject to reservoir storage and drought conditions.
 - 5. Gates 5 and 6 operated to full close and back to full open once per week.
 - 6. Gate operation shall be from either local control mode, or remote control mode.
- F. The CONTRACTOR shall submit a Final Acceptance Testing Plan for review and acceptance prior to execution. At minimum, the Final Acceptance Testing Plan shall include the proposed daily operating schedule, and 24-hour contact information of CONTRACTOR personnel performing the tests.
- G. The CONTRACTOR shall submit weekly testing status reports to the ENGINEERING summarizing at minimum tests performed, issues encountered (if any), and proposed changes to the operating schedule (if any).
- H. Upon completion of Final Acceptance Testing the CONTRACTOR shall make all final adjustments, repairs and replacements as required to comply with the Project Documents and the OWNER provided punch list of any remaining items to be

corrected by the CONTRACTOR and retest all components to demonstrate such, prior to final acceptance by the OWNER.

- I. Results of Final Acceptance Testing shall be submitted and fully documented in an Final Acceptance Testing Report. The report shall include dates of testing; test equipment utilized; person performing tests and OWNER witness; tests made including gate positions and times of operation; SCADA logging data if available; specified or manufacturer provided comparative acceptable test results; reservoir elevation at time of test; actual test results including maximum hydraulic system operating pressures for each test and any observations; noises, vibrations and other conditions observed; corrections made (if any); and results of retesting for each piece of equipment of component tested.

3.07 CLOSEOUT ACTIVITIES

- A. Manufacturer's Field Services:
1. Demonstration and Training:
 - a. Provide 1 day of OWNER (operator) training for the HPU.
 - b. Schedule training with the ENGINEER and provide at least one weeks advanced notice.
 - c. See also Specification Section 01 75 00 – Starting and Adjusting.

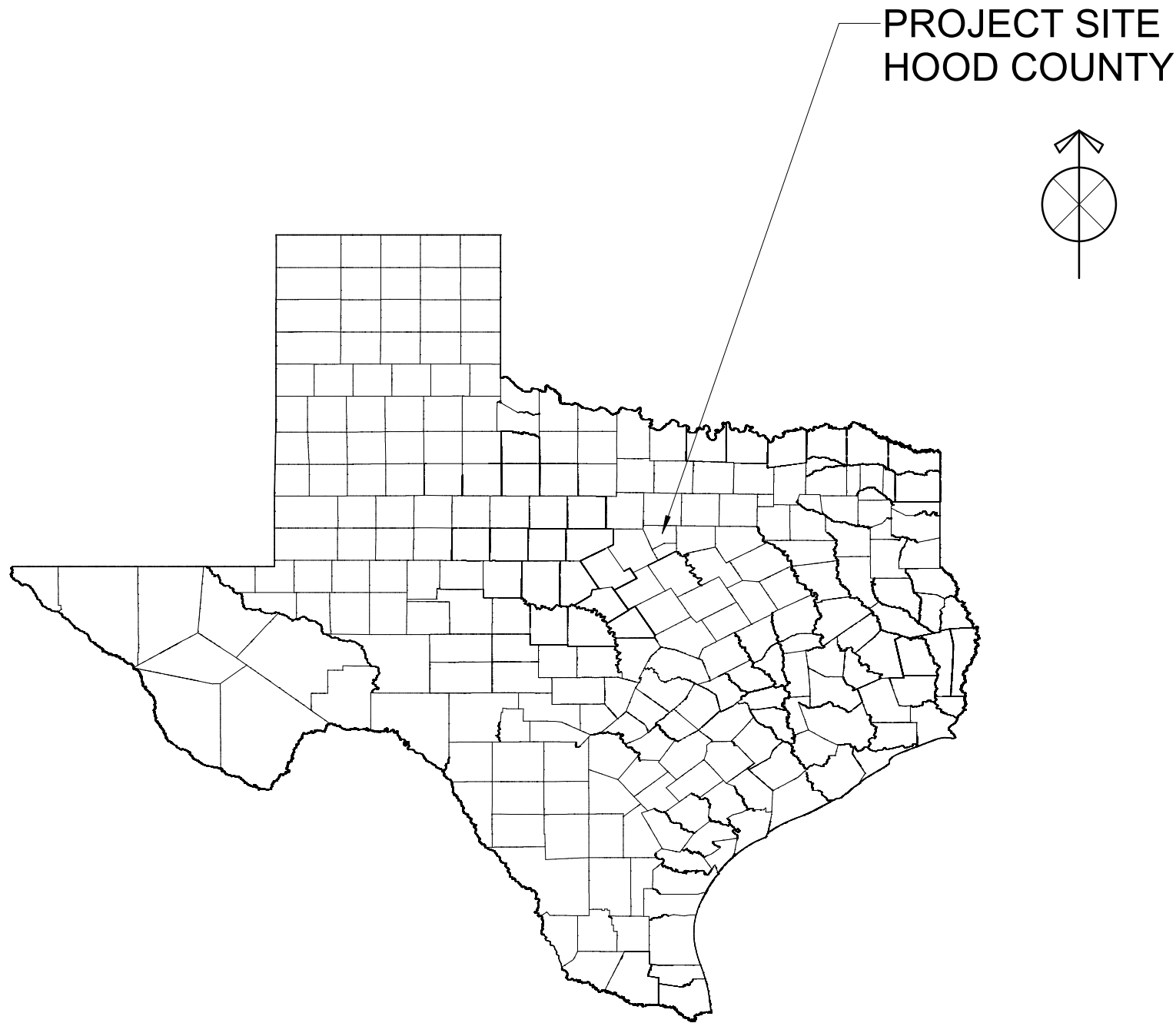
END OF SECTION

REV. NO.	REV. DATE	RFC/CN/CO	Section(s) Affected	Comments

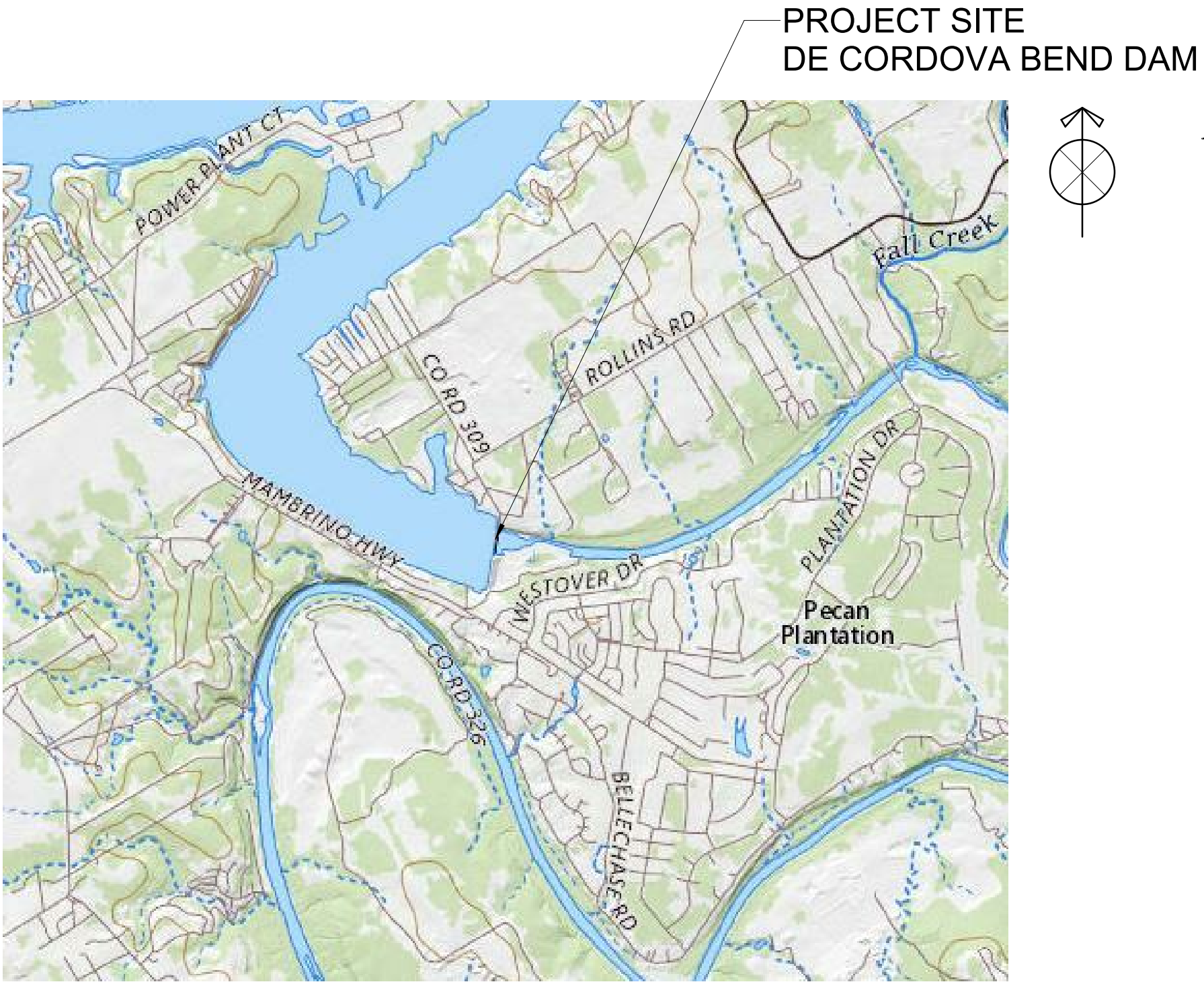


LAKE GRANBURY DE CORDOVA BEND DAM
LOW FLOW OUTLET WORKS REPAIR PROJECT
FINAL DESIGN SUBMITTAL

APRIL 2021




LOCATION MAP
SCALE: N.T.S.

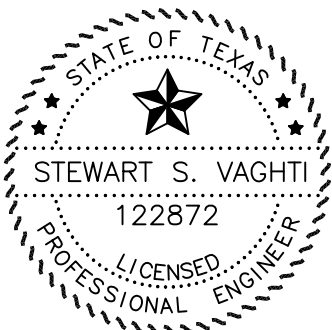


VICINITY MAP
SCALE: N.T.S.

DRAWING INDEX

SHEET	DRAWING NO.	SHEET NAME
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2	S001	GENERAL NOTES
3	S002	SITE PLAN
4	S201	EXISTING GATE 5 & 6 DEMOLITION/REMOVAL
5	S202	DEMOLITION/REMOVAL DETAILS
6	S203	NORTH AND SOUTH BAY SECTIONS AND ELEVATION
7	S204	NEW GATE 5 & 6 ELEVATIONS AND SECTIONS
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10	E001	ELECTRICAL SYMBOLS, LEGENDS & ABBREVIATIONS
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19	R006	EXISTING 48"X54" GATE 3 DRAWING (FOR REFERENCE ONLY)
20	R007	GATE TESTING SUMMARY TABLE (FOR REFERENCE ONLY)


ENGINEER-OF-RECORD
DATE 4/30/2021



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BRA FILE NO.:	DRAWING NO. S000
DWG LABEL: _S_central_R19.rvt	SHEET NO. 1

Project Number: 21-05-1219
5/3/2021 6:14:00 AM
Local File: BIM 360/066396 - De Cordova Low Flow/66396_Central_R20_BIM360.rvt
\\S_central_R19.rvt

GENERAL NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING, HOLDING, UNDERSTANDING, MAINTAINING AND COMPLYING WITH THE LICENSES, REGULATIONS, ORDINANCES, CONDITIONS AND PERMITS OF THE VARIOUS AUTHORITIES HAVING JURISDICTION OVER THE WORK.
2. IN ACCORDANCE WITH REGULATIONS, PERMITS AND GENERALLY ACCEPTED CONSTRUCTION PRACTICES, THE CONTRACTOR WILL BE SOLELY AND COMPLETELY RESPONSIBLE FOR CONDITIONS OF THE JOB SITE, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY DURING PERFORMANCE OF THE WORK.
3. WORK INCIDENTAL TO THE CONTRACT AND NECESSARY TO COMPLETE THE PROJECT, ALTHOUGH NOT SPECIFICALLY REFERENCED ON THE CONTRACT DOCUMENTS, SHALL BE FURNISHED AND PERFORMED BY THE CONTRACTOR.
4. THE CONTRACTOR IS RESPONSIBLE FOR CHECKING, VERIFYING AND ACCOUNTING FOR THE EXISTING CONDITIONS AND DIMENSIONS OF ALL ITEMS RELATED TO THE PROJECT. THE CONTRACTOR IS ALSO RESPONSIBLE FOR VERIFYING AND CHECKING ALL DIMENSIONS AND DETAILS ON THE CONSTRUCTION DRAWINGS AND SPECIFICATIONS FOR ANY DISCREPANCY. ANY DISCREPANCY SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION.
5. IF CONFLICTS EXIST BETWEEN CONTRACT DOCUMENTS, THE CONTRACTOR IS RESPONSIBLE FOR EITHER SUBMITTING AN RFI TO RESOLVE THE CONFLICT OR MEETING THE MORE STRINGENT REQUIREMENT.
6. IF DIMENSIONAL ERRORS OR CONFLICTS ARE FOUND, THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND SHALL WAIT FOR CLARIFICATION BEFORE RESUMING OR COMMENCING WORK ON THE DISCREPANCY ITEM.
7. THESE PLANS, CORRESPONDING SPECIFICATIONS AND REFERENCE DOCUMENTS ARE PART OF THE CONTRACT DOCUMENTS. UNLESS SPECIFIED WITHIN THE CONTRACT DOCUMENTS, ALL CONSTRUCTION, MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE CITY OF GRANBURY STANDARD SPECIFICATIONS FOR PUBLIC WORKS.
8. THE NORMAL LAKE LEVEL IS SHOWN ON THE PLANS FOR CONVENIENCE. THE CONTRACTOR IS RESPONSIBLE FOR MONITORING LAKE LEVELS AND PLANNING WORK ACCORDINGLY. DAILY LAKE LEVELS CAN BE FOUND AT:
https://waterdata.usgs.gov/tx/nwis/uv?site_no=08090900 AND <http://granbury.lakesonline.com/Level/>
9. DRAWINGS DO NOT INCLUDE COMPONENTS THAT MAY BE NECESSARY FOR CONSTRUCTION SAFETY. THE CONTRACTOR IS RESPONSIBLE FOR SAFETY IN AND AROUND THE JOB SITE DURING CONSTRUCTION.

POLLUTION AND SEDIMENT CONTROL NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR PREPARING, MAINTAINING, EXECUTING, AND UPDATING A POLLUTION PREVENTION PLAN FOR THIS CONTRACT THAT COVERS ALL CONSTRUCTION AND CONSTRUCTION-RELATED ACTIVITIES OF THE PROJECT AT THE SITE IN ACCORDANCE WITH TCEQ AND FEDERAL REQUIREMENTS.
2. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ANY REQUIRED PERMITS OR AUTHORIZATIONS FOR DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES.
3. THE POLLUTION PREVENTION PLAN IS THE CONTRACTOR'S DOCUMENT THAT CHARACTERIZES THE CONSTRUCTION ACTIVITIES, IDENTIFIES POTENTIAL SOURCES OF POLLUTANTS, AND DESCRIBES HOW THE SITE WILL BE MANAGED AND MONITORED, AND THE BEST MANAGEMENT PRACTICES (BMPS) THAT WILL BE IMPLEMENTED TO HELP ENSURE POLLUTANTS DO NOT REACH SURFACE WATERS.
4. THE CONTRACTOR MAY UTILIZE THE LOW FLOW WEIR BASIN AS A COLLECTION AND SEDIMENT BASIN AND IS RESPONSIBLE FOR ISOLATING THE BASIN SUCH THAT NO UNAUTHORIZED DISCHARGES ARE MADE.
5. POLLUTION PREVENTION SHALL AT MINIMUM ADDRESS THE FOLLOWING:
 - POTENTIAL SOURCES OF POLLUTANTS FROM CONSTRUCTION ACTIVITIES
 - THEIR CORRESPONDING BMPS THAT WILL BE IMPLEMENTED
 - PLAN FOR MONITORING THE SITE AND MAINTAINING BMPS
 - PLAN FOR LAWFUL DISPOSAL OF SEDIMENT AND POLLUTANTS
 - PERMITS AND/OR JURISDICTIONAL AUTHORIZATIONS (IF REQUIRED)
6. SEE ALSO SPECIFICAITON SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

DATUM NOTE

1. ALL ELEVATIONS SHOWN ARE ACCORDING TO BRA DATUM WHICH IS APPROXIMATELY 1.1 FEET LOWER THAN NAVD 88 DATUM.

STRUCTURAL GENERAL NOTES

1. ANCHORAGE TO EXISTING CONCRETE DESIGN IS BASED ON ACI 350.
2. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING MECHANICAL AND ELECTRICAL EQUIPMENT SUPPORTS, ANCHORAGES, OPENINGS, RECESSES AND REVEALS NOT SHOWN ON THE DRAWINGS INCLUDING DECONFLICTING AND/OR RECEIVING APPROVAL FOR LOCATIONS PRIOR TO EXECUTION.
3. STRUCTURES HAVE BEEN DESIGNED FOR OPERATIONAL LOADS ON THE COMPLETED STRUCTURES. DURING CONSTRUCTION, THE STRUCTURES SHALL BE PROTECTED BY BRACING AND BALANCING WHEREVER EXCESSIVE CONSTRUCTION LOADS MAY OCCUR.
4. ALL PATCHING OF CONCRETE SHALL BE CONSIDERED STRUCTURAL. NOTIFY THE ENGINEER ON A CASE BY CASE BASIS.
5. WHEN DRILLING, CHIPPING, SAWCUTTING, OR CORING INTO CONCRETE, X-RAY OR FERROSCAN EXISTING CONCRETE TO LOCATE REINFORCING. DO NOT CUT, NICK, OR OTHERWISE DAMAGE EXISTING REINFORCING WITHOUT WRITTEN APPROVAL FROM THE ENGINEER.

LOW FLOW DEWATERING AND BULKHEAD NOTES

1. UNDER THIS WORK, THE CONTRACTOR IS RESPONSIBLE FOR SELECTING, DESIGNING, MAINTAINING, AND REMOVING DEWATERING SYSTEM SUFFICIENT TO COMPLETE THE PROJECT.
2. ALL DEWATERING DISCHARGES SHALL BE COORDINATED WITH THE POLLUTION PREVENTION PLAN AND DISPOSAL OF WATER MUST COMPLY WITH TCEQ AND FEDERAL REQUIREMENTS.
3. OWNER SUPPLIED BULKHEAD (STOP LOGS) WILL BE INSTALLED AT THE BEGINNING OF CONSTRUCTION BY THE OWNER.
4. BULKHEAD CREST ELEVATION IS 696.0'
5. THE BULKHEAD IS NOT FULLY WATERTIGHT AND THE CONTRACTOR IS RESPONSIBLE FOR SEALING THE BULKHEAD (AND MAINTAINING THE SEALING SYSTEM) AS NECESSARY TO EXECUTE THE PROJECT.
6. THE SEALING SYSTEM SHALL NOT DAMAGE OR REQUIRE MODIFICATIONS TO THE EXISTING BULKHEAD SYSTEM. THE CONTRACTOR IS RESPONSIBLE FOR REPAIRING ANY DAMAGE TO THE EXISTING BULKHEAD OR REPLACING IF UNREPAIRABLE.
7. FOR FULL HEAD GATE TESTING THAT REQUIRES BULKHEAD REMOVAL (SEE SPECIFICATION SECTION 41 24 26 - HYDRAULIC POWER UNIT), THE OWNER WILL REMOVE THE BULKHEADS. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING THE SEALING SYSTEM AND RE-INSTALLING ANY CONTRACTOR-REMOVED TRASH RACKS IN ADVANCE OF BULKHEAD REMOVAL, PROVIDING A MINIMUM 14 CALENDAR DAYS ADVANCED NOTICE OF WHEN THE CONTRACTOR IS READY FOR THE BULKHEAD REMOVAL, AND COORDINATING WITH THE OWNER.
8. THE CONTRACTOR SHALL ACCOMODATE THE OWNER INCLUDING A TWO (2) DAY REMOVAL PERIOD AND FULL ACCESS TO THE DECK WITH NO CONFLICTING CONSTRUCTION ACTIVITIES DURING THE BULKHEAD REMOVAL.
9. THE CONTRACTOR SHALL SUBMIT A LOW FLOW DEWATERING PLAN IN ACCORDANCE WITH SPECIFICATION SECTION 01 33 00 - SUBMITTAL PROCEDURES WHICH INCLUDES AT MINIMUM THE FOLLOWING:
 - BULKHEAD SEALING PLAN AND MATERIALS
 - WATER COLLECTION AND DISCHARGE LOCATION

CONTRACTOR STAGING PARKING AND ACCESS NOTES

1. ACCESS TO THE SITE IS FROM MAMBRINO HWY OR RAINEY CT.
2. CONTRACTOR STAGING PARKING AND LAYDOWN AREA SHALL BE AT THE LEFT ABUTMENT WITHIN THE FOOTPRINTS APPROXIMATELY SHOWN ON DRAWING S002 (SHEET 3).
3. NO STAGING ON THE NORTH OR SOUTH EMBANKMENTS.
4. NO LONG TERM STAGING WITHIN THE BRIDGE DECK WITHOUT PRIOR APPROVAL FROM THE ENGINEER.
5. TEMPORARY STAGING ON THE LOW FLOW BRIDGE DECK IS ALLOWED DURING NORMAL WORKING HOURS AND MUST BE COORDINATING WITH THE ENGINEER.
6. TEMPORARY CONSTRUCTION LOADING ON THE EXISTING BRIDGE DECK SHALL NOT EXCEED AN AASHTO HS-15 LOADING AND WHEEL LOADS (AND OUTRIGGERS) MUST BE CENTERED OVER THE DECK BEAMS (SEE BRIDGE DECK TYPICAL SECTION ON DRAWING R005).
7. THERE IS NO DIRECT ACCESS TO THE DOWNSTREAM AREA (WEIR BASIN).
8. ALL MATERIALS AND EQUIPMENT SHALL BE SECURED AND/OR PROTECTED FROM MOVEMENT DUE TO HIGH WINDS.
9. SEE ALSO DRAWING S002 (SHEET 3), SITE PLAN.
10. THE CONTRACTOR SHALL SUBMIT A STAGING LAYOUT PLAN IDENTIFYING LOCATIONS, DIMENSIONS, TEMPORARY FACILITIES, PARKING AND ACCESS IN ACCORDANCE WITH SPECIFICATION SECTION 01 33 00 - SUBMITTAL PROCEDURES. SEE ALSO:
 - SPECIFICATION SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

COATING GENERAL NOTES

1. RECOAT EXISTING EXPOSED CAST / MILD STEEL GATE COMPONENTS INCLUDING THIMBLES AND CONDUITS FOR LOW FLOW GATES 1 THROUGH 6.
2. DO NOT COAT STAINLESS STEEL AND MOVING PARTS.
3. SEE SPECIFICATION SECTION 09 90 00 - PAINTING FOR ADDITIONAL REQUIREMENTS.

ABBREVIATIONS

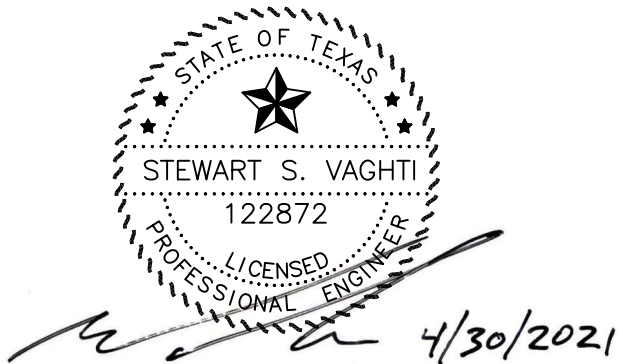
ACI	AMERICAN CONCRETE INSTITUTE
AHJ	AUTHORITY HAVING JURISDICTION
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
AWWA	AMERICAN WATER WORKS ASSOCIATION
CLR	CLEAR
DIA	DIAMETER
EL	ELEVATION
E.G.	FOR EXAMPLE
EMBED	EMBEDMENT
ETR	EXISTING TO REMAIN
HPU	HYDRAULIC POWER UNIT
N.T.S.	NOT TO SCALE
S.S.	STAINLESS STEEL
TCEQ	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
THK	THICK
TYP	TYPICAL

REV	DESCRIPTION	BY	DATE

VERIFY SCALES
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SCALES ACCORDINGLY

RFB NO:	21-05-1219
DRAWN BY:	DJB
DESIGNED BY:	SSV
REVIEWED BY:	DLR
APPROVED BY:	
DATE:	4/30/2021



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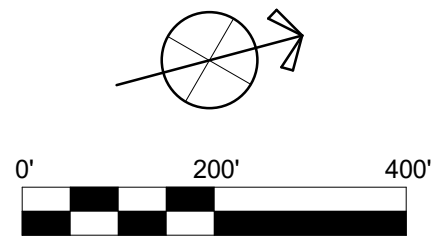


DE CORDOVA BEND DAM
LOW FLOW OUTLET WORKS REPAIR PROJECT
GENERAL NOTES

BRA FILE NO.:	DRAWING NO. S001
DWG LABEL: _S_central_R19.rvt	SHEET NO. 2



SITE PLAN



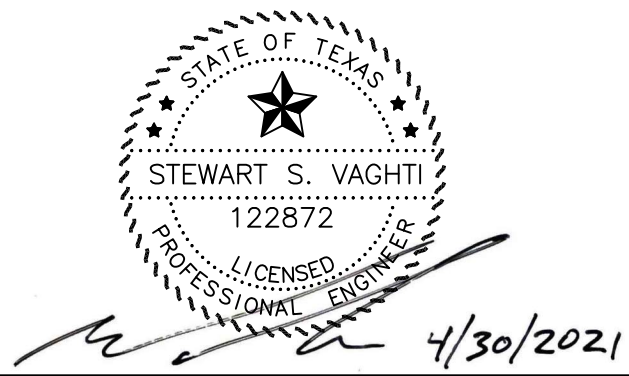
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REV	DESCRIPTION	BY	DATE

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DE CORDOVA BEND DAM
LOW FLOW OUTLET WORKS REPAIR PROJECT
SITE PLAN

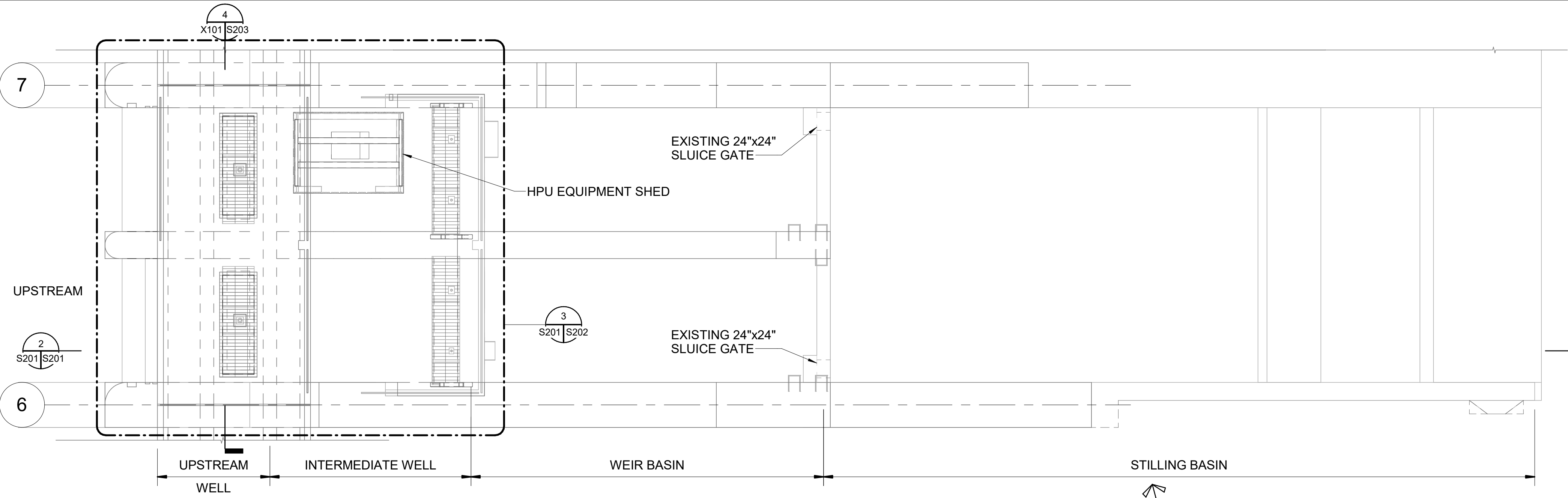
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DWG LABEL: _S_central_R19.rvt	SHEET NO. 3

SHEET NOTES:

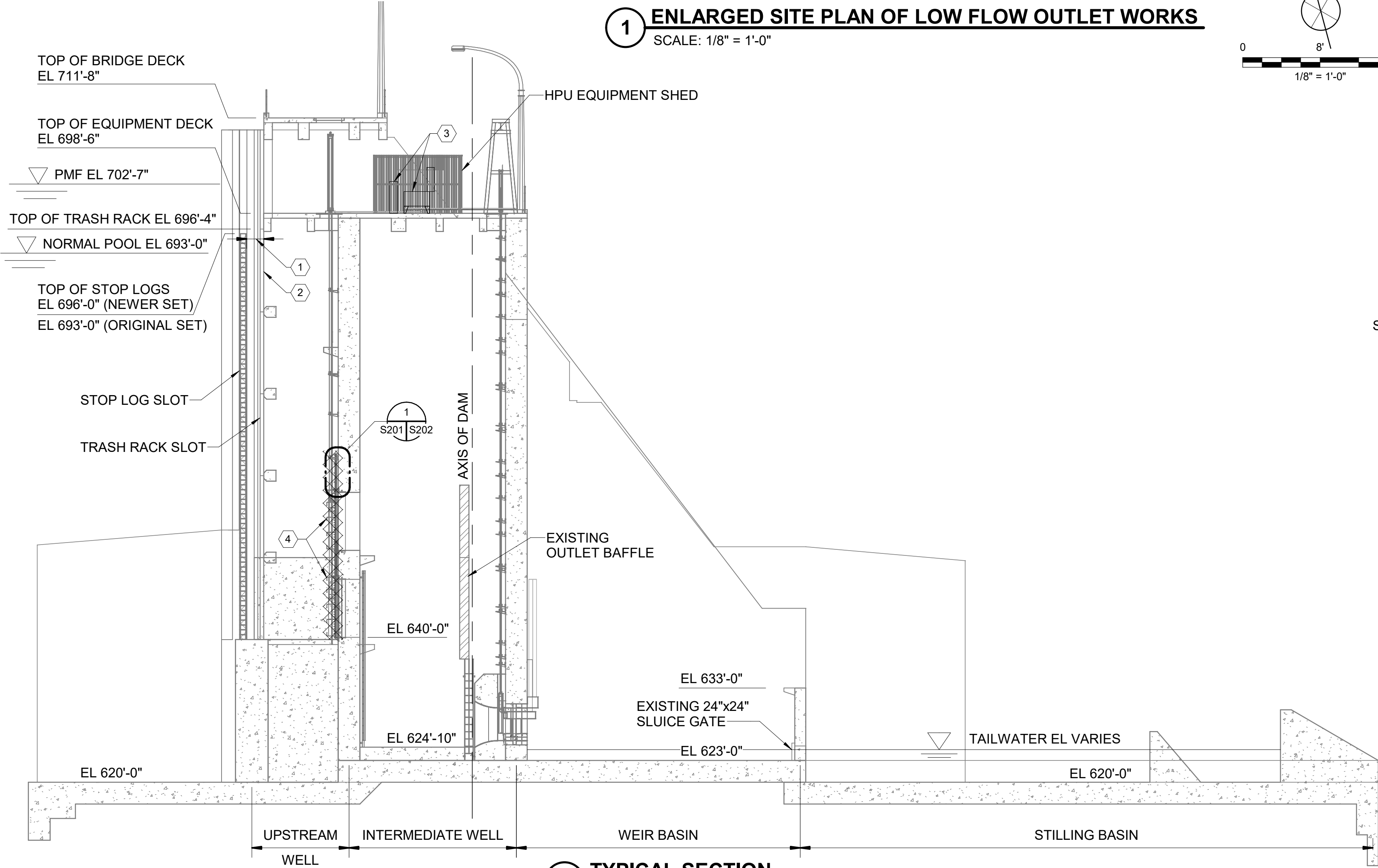
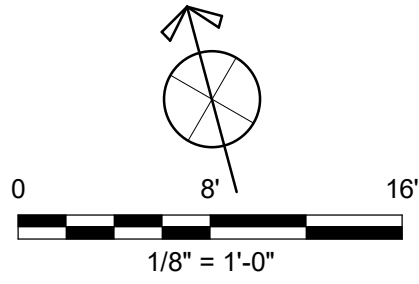
- 1 CLEARANCE BETWEEN STOP LOG AND THE EQUIPMENT DECK IS APPROXIMATELY 26" FOR GATE EXTRACTION (CONTRACTOR TO FIELD VERIFY).
- 2 THE CONTRACTOR SHALL REMOVE THE EXISTING TRASH RACKS AS NECESSARY TO ACCOMMODATE REMAINING WORK, AND REPLACE PRIOR TO SUBSTANTIAL COMPLETION. EACH TRASH RACK PANEL IS APPROXIMATELY 11'-4" IN HEIGHT.
- 3 DISCONNECT, REMOVE AND DISPOSE OF EXISTING HPU AND KLEENVENT ISOLATOR. STAINLESS STEEL PIPING AND HYDRAULIC CYLINDERS TO REMAIN. ANY NON-STAINLESS STEEL ANCHOR BOLTS CUT SHALL BE CUT FLUSH WITH THE SURFACE, PREPARED AND COATED WITH SIKA ARMATEC 100 EPOCEM ANTI-CORROSION PROTECTION SYSTEM (OR APPROVED EQUAL PER MANUFACTURER'S SPECIFICATIONS).
- 4 REMOVE GATES 5 AND 6 INCLUDING FRAME AND UPPER FRAME GROUT BLOCKOUT/PAD (THIMBLES TO REMAIN). ANY ANCHOR BOLTS CUT SHALL BE CUT FLUSH WITH THE SURFACE, PREPARED AND COATED WITH SIKA ARMATEC 100 EPOCEM ANTI-CORROSION PROTECTION SYSTEM (OR APPROVED EQUAL PER MANUFACTURER'S SPECIFICATIONS).

EXISTING GATES 5 & 6 REMOVAL NOTES:

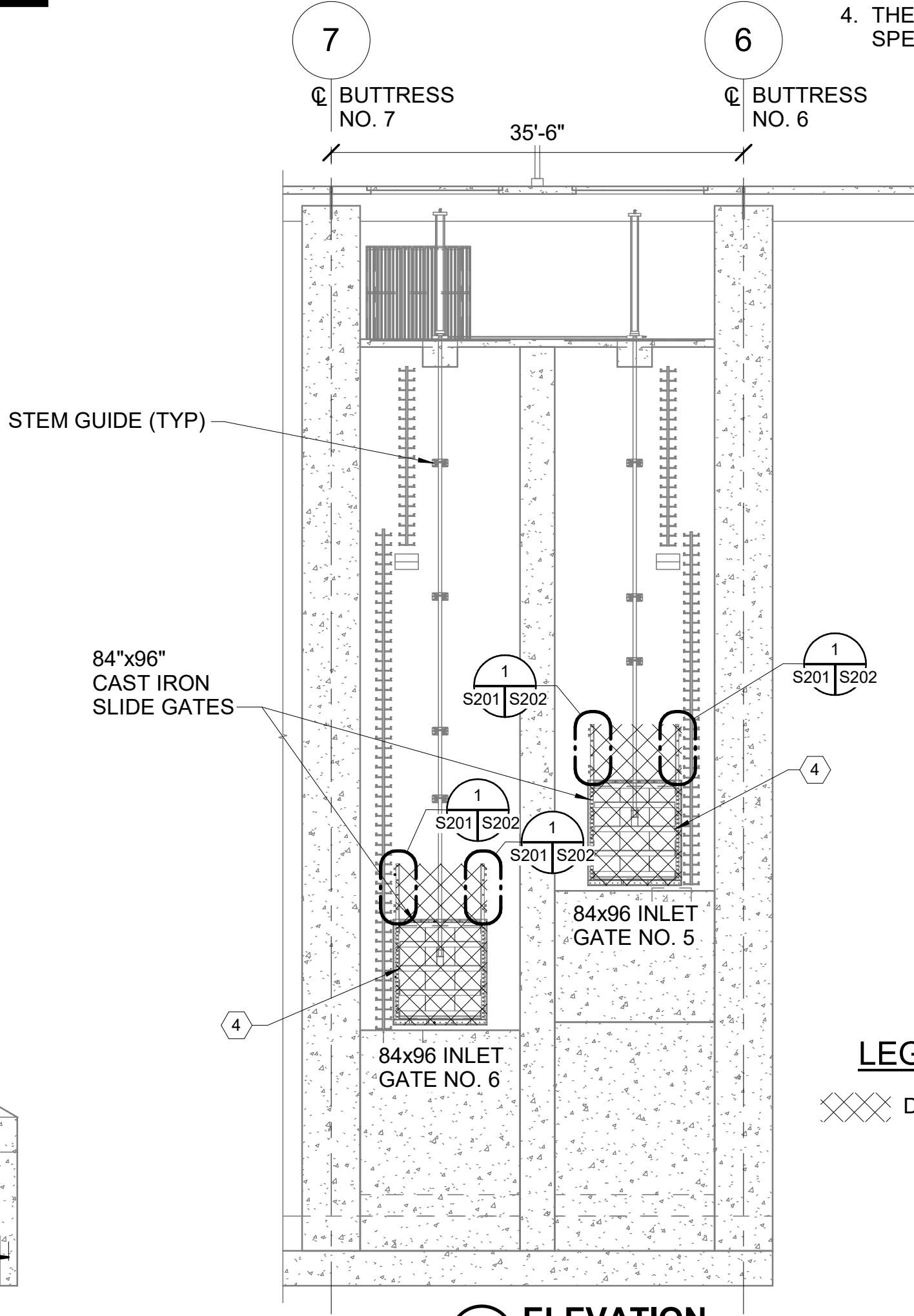
- 1. REMOVAL OF THE EXISTING CAST IRON GATES 5 & 6 TO ACCOMMODATE THE REPLACEMENT GATES IS A MEANS AND METHODS OPERATION. GATE REMOVAL INCLUDES THEIR RESPECTIVE CAST IRON FRAMES.
- 2. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTING THE EXISTING STRUCTURE AND FEATURES THAT WILL REMAIN IN-PLACE AND IN OPERATION. THIS INCLUDES (BUT IS NOT LIMITED TO) THE EXISTING STOPLOGS, LADDERS, STEMS, STEM GUIDES, CYLINDERS, THIMBLES AND THE THIMBLES THREADED BOLT HOLES.
- 3. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING AND ACCOUNTING FOR THE CONDITION OF THE GATES AND VERIFYING EXISTING CONDITIONS AND DIMENSIONS OF ALL ITEMS RELATED TO THE PROJECT.
- 4. THE CONTRACTOR SHALL SUBMIT FOR REVIEW A GATE REMOVAL PLAN. SEE SPECIFICATION SECTION 02 41 00 - DEMOLITION FOR ADDITIONAL INFORMATION.



1 ENLARGED SITE PLAN OF LOW FLOW OUTLET WORKS
SCALE: 1/8" = 1'-0"



2 TYPICAL SECTION
SCALE: 3/32" = 1'-0"



3 ELEVATION
SCALE: 3/32" = 1'-0"

LEGEND

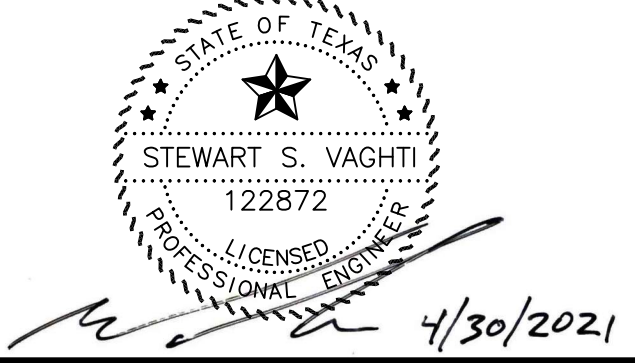
XXXX DEMO/REMOVAL ITEM

REV	DESCRIPTION	BY	DATE

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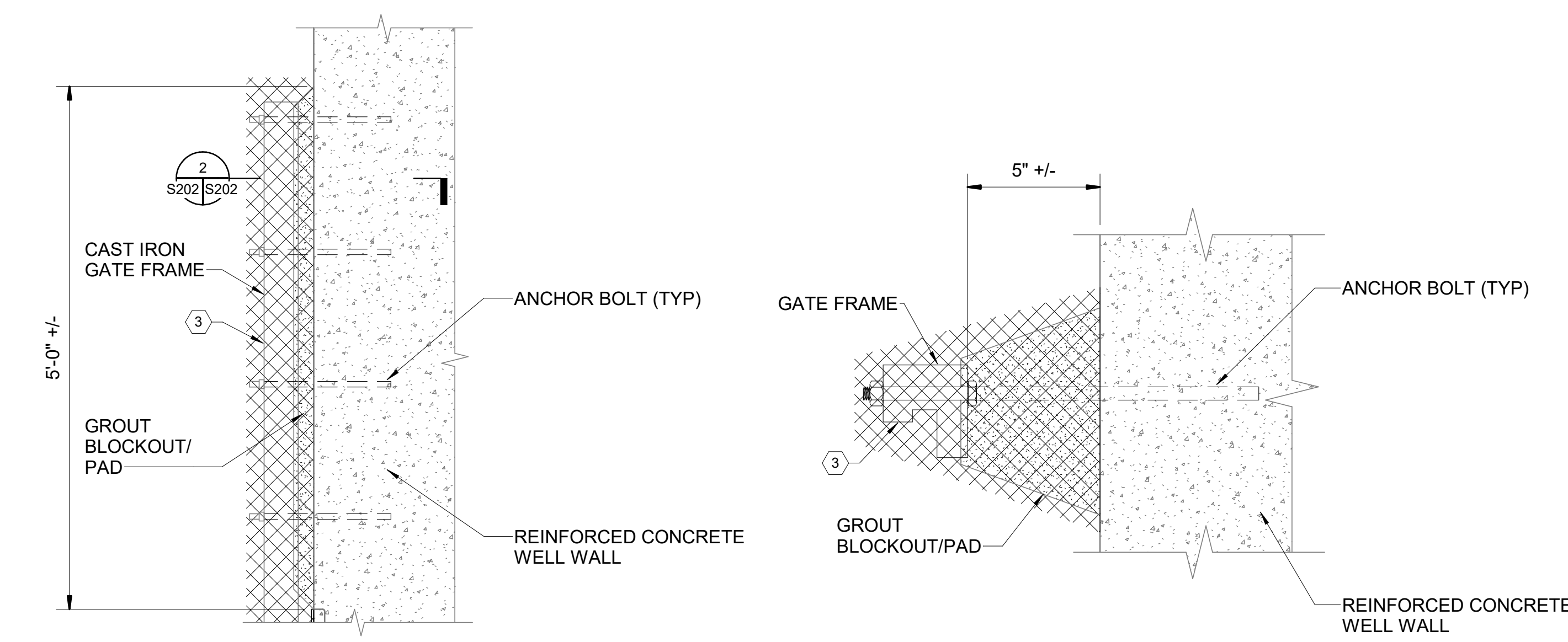


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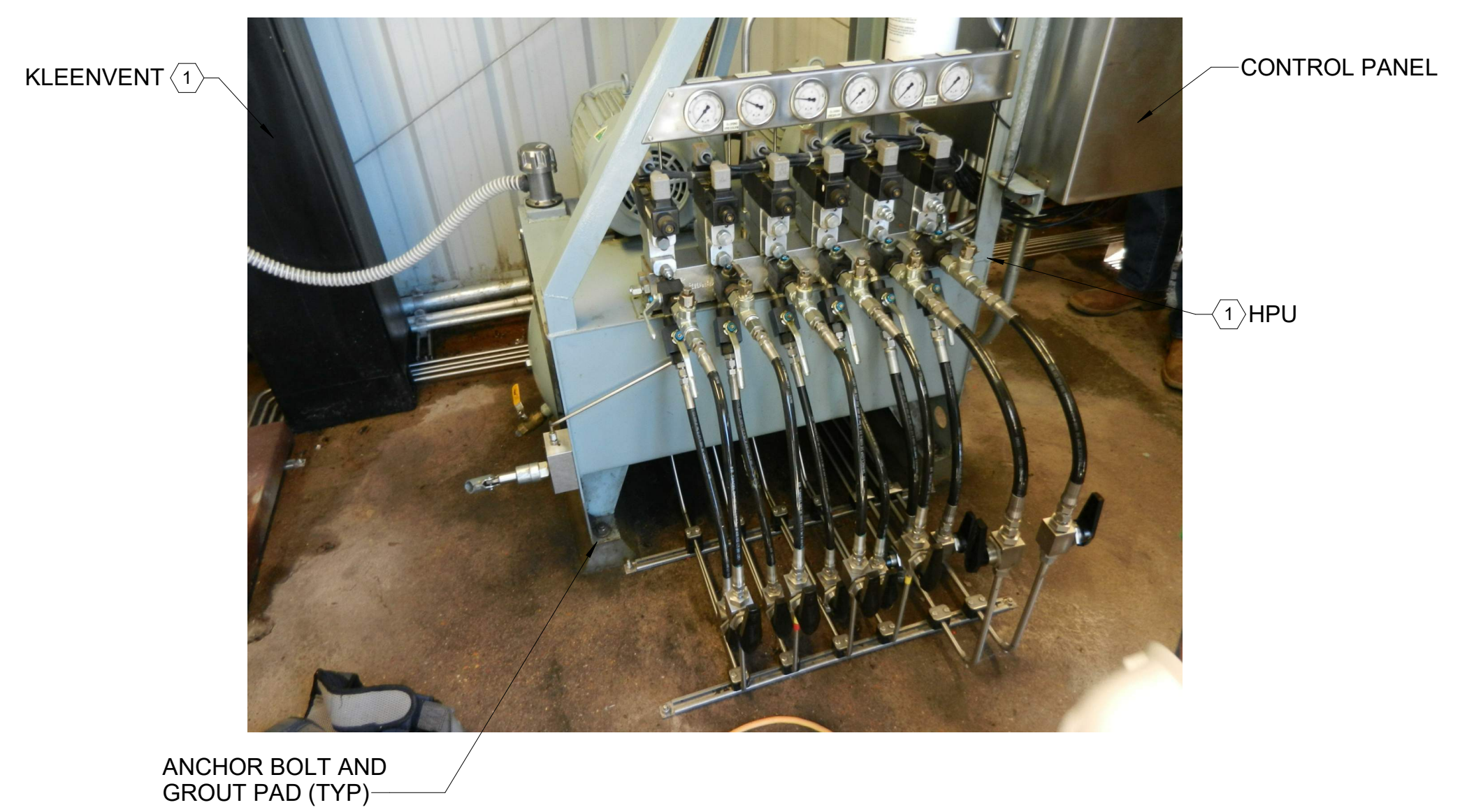
DE CORDOVA BEND DAM
LOW FLOW OUTLET WORKS REPAIR PROJECT
EXISTING GATE 5 & 6 DEMOLITION/REMOVAL

BRA FILE NO.:	DRAWING NO. S201
DWG LABEL: _S_central_R19.rvt	SHEET NO. 4



1 UPPER FRAME ATTACHMENT DETAIL
S202 SCALE: 1" = 1'-0"

2 UPPER FRAME ATTACHMENT DETAIL
S202 SCALE: 3" = 1'-0"

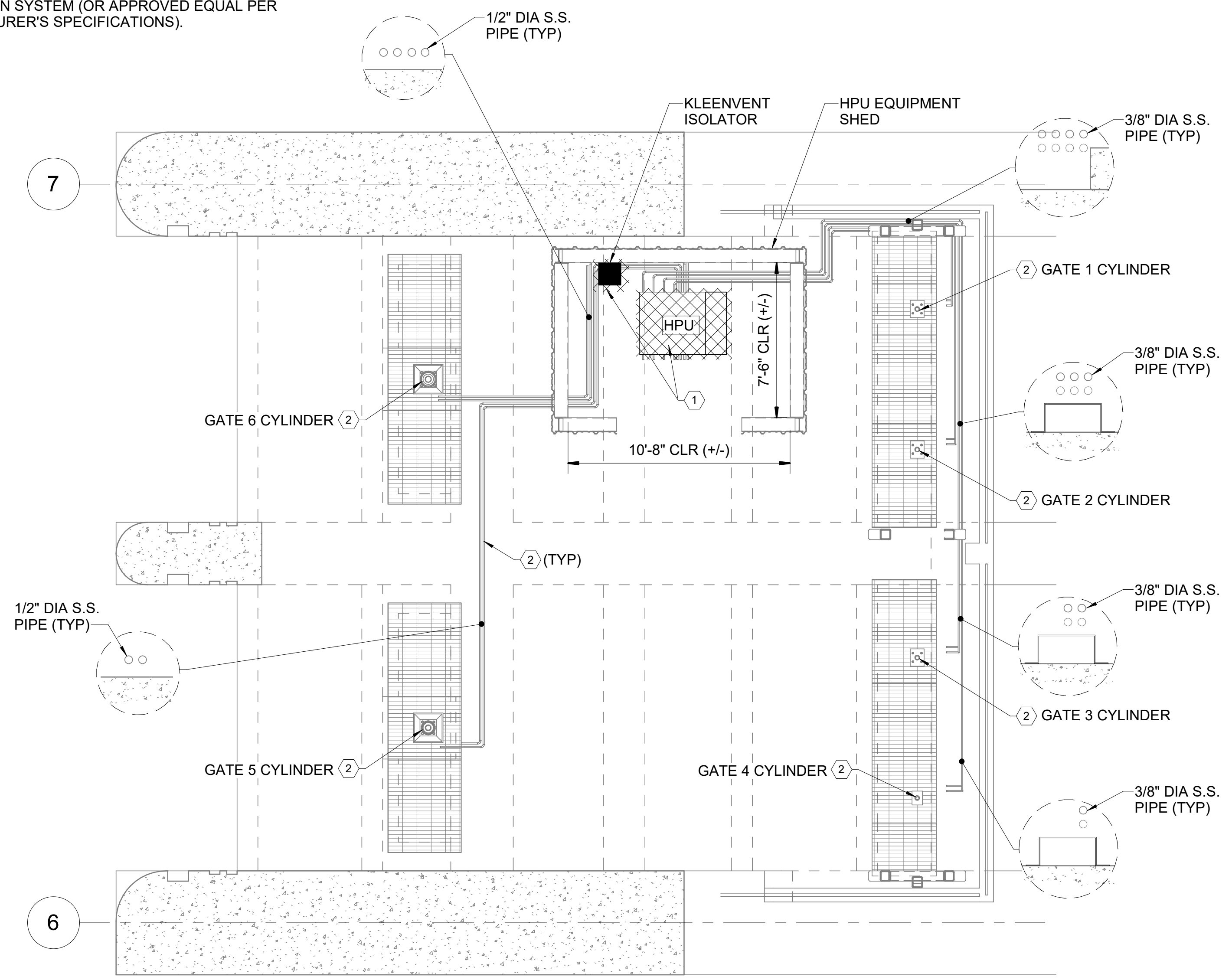


HPU PHOTO
NTS

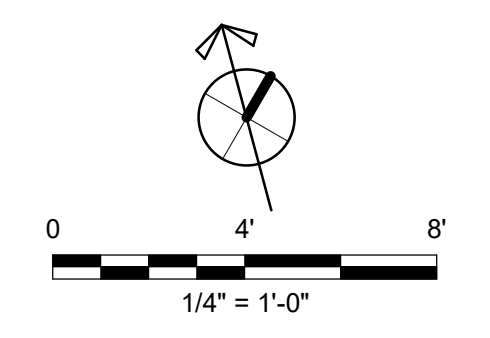
- SHEET NOTES:**
- 1 DISCONNECT, REMOVE AND DISPOSE OF EXISTING HPU AND KLEENVENT ISOLATOR. ANY NON-STAINLESS STEEL ANCHOR BOLTS CUT SHALL BE CUT FLUSH WITH THE SURFACE, PREPARED AND COATED WITH SIKA ARMATEC 100 EPOCEM ANTI-CORROSION PROTECTION SYSTEM (OR APPROVED EQUAL PER MANUFACTURER'S SPECIFICATIONS).
 - 2 STAINLESS STEEL PIPING AND HYDRAULIC CYLINDERS TO REMAIN.
 - 3 REMOVE GATES 5 AND 6 INCLUDING FRAME AND UPPER FRAME GROUT BLOCKOUT/PAD (THIMBLES TO REMAIN). ANY ANCHOR BOLTS CUT SHALL BE CUT FLUSH WITH THE SURFACE, PREPARED AND COATED WITH SIKA ARMATEC 100 EPOCEM ANTI-CORROSION PROTECTION SYSTEM (OR APPROVED EQUAL PER MANUFACTURER'S SPECIFICATIONS).

LEGEND

XXXXXX DEMO/REMOVAL ITEM



3 HYDRAULIC PIPING PLAN
S202 SCALE: 1/4" = 1'-0"



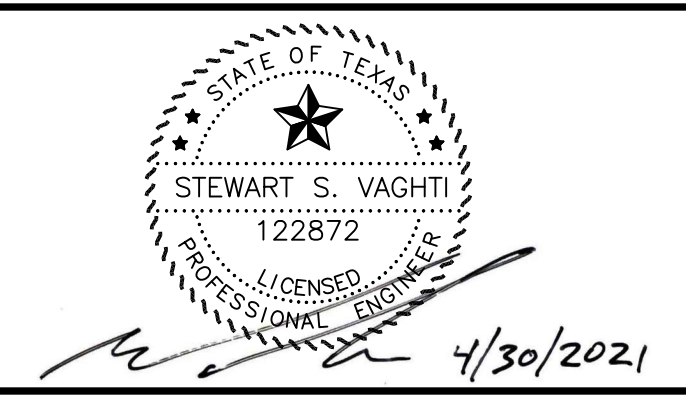
Local File: BIM 360/1066396 - De Cordova Low Flow/66396_Central_R20_BIM360.rvt
5/3/2021 6:14:07 AM
Project Number: 21-05-1219

REV	DESCRIPTION	BY	DATE

VERIFY SCALES
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SCALES ACCORDINGLY

RFB NO:	21-05-1219
DRAWN BY:	DJB
DESIGNED BY:	SSV
REVIEWED BY:	DLR
APPROVED BY:	
DATE:	4/30/2021



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DE CORDOVA BEND DAM
LOW FLOW OUTLET WORKS REPAIR PROJECT
DEMOLITION/REMOVAL DETAILS

BRA FILE NO.:	DRAWING NO. S202
DWG LABEL: _S_central_R19.rvt	SHEET NO. 5

SHEET NOTES:

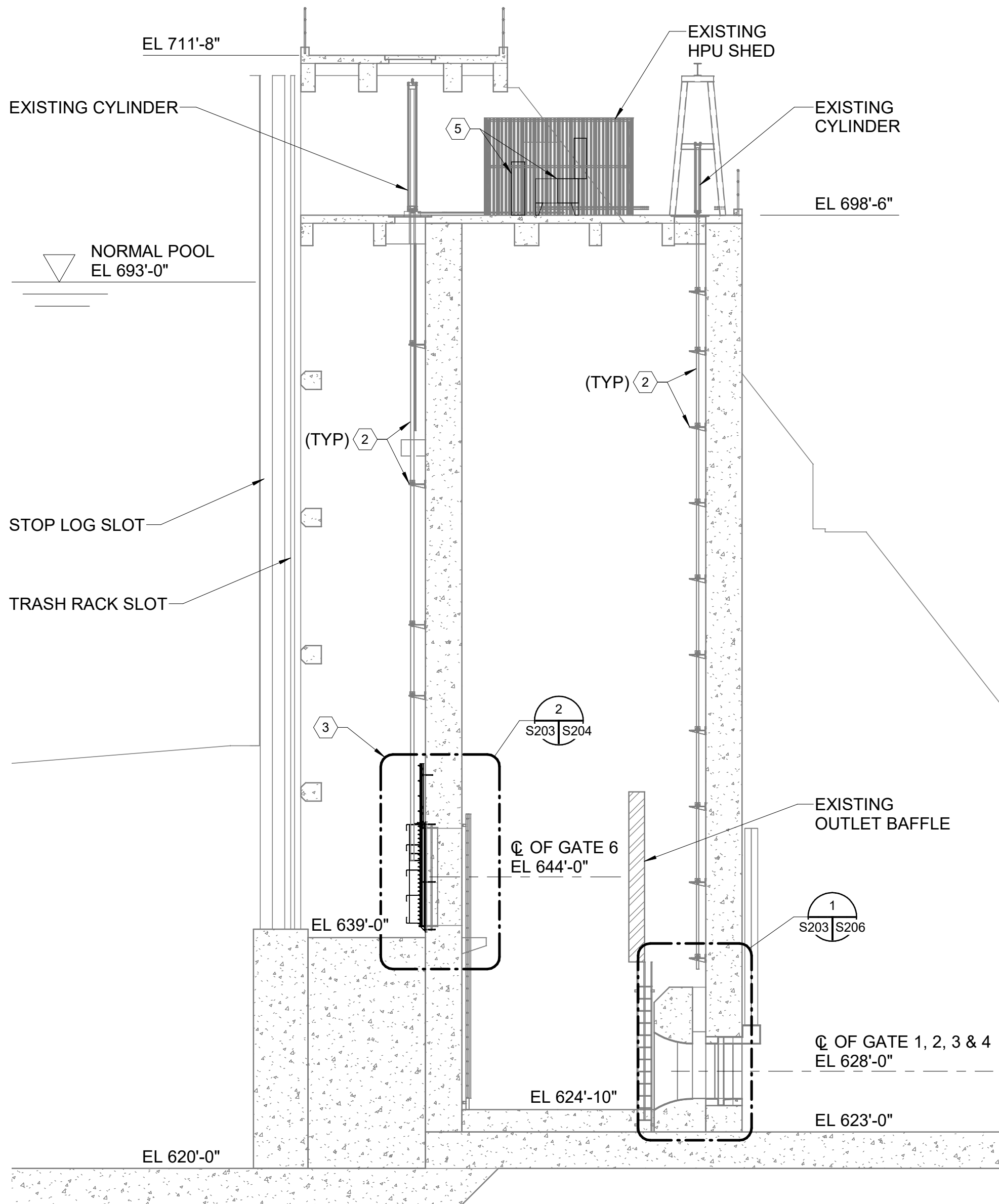
1. REMOVE AND REPLACE THE EXISTING CENTER SAFETY RAILS IN ACCORDANCE WITH THE CENTER SAFETY RAILS REPLACEMENT NOTES ON THIS SHEET.
2. CLEAN AND TREAT EXISTING STAINLESS STEEL GATE STEMS AND STEM GUIDES FOR GATES 1, 2, 3, 4, 5 AND 6 IN ACCORDANCE WITH THE STAINLESS STEEL FIELD CLEANING AND PASSIVATION NOTES ON DRAWING S203 (SHEET 6).
3. INSTALL AND TEST NEW 316 STAINLESS STEEL SLIDE GATE. SEE GATES 5 & 6 REPLACEMENT NOTES AND PROJECT SPECIFICATIONS.
4. CHECK AND MAKE ADJUSTMENTS TO GATE 5 & 6 GUIDES, STEMS, STEM GUIDE FASTENERS FOR TIGHTNESS AND ALIGNMENT FOR A PROPERLY-FUNCTIONING GATE AND SECURE/REPLACE/ADJUST AS NECESSARY.
5. REPLACE HPU AND KLEENVENT ISOLATOR. SEE SPECIFICATION SECTION 41 24 26 - HYDRAULIC POWER UNIT.

CENTER SAFETY RAIL REPLACEMENT NOTES:

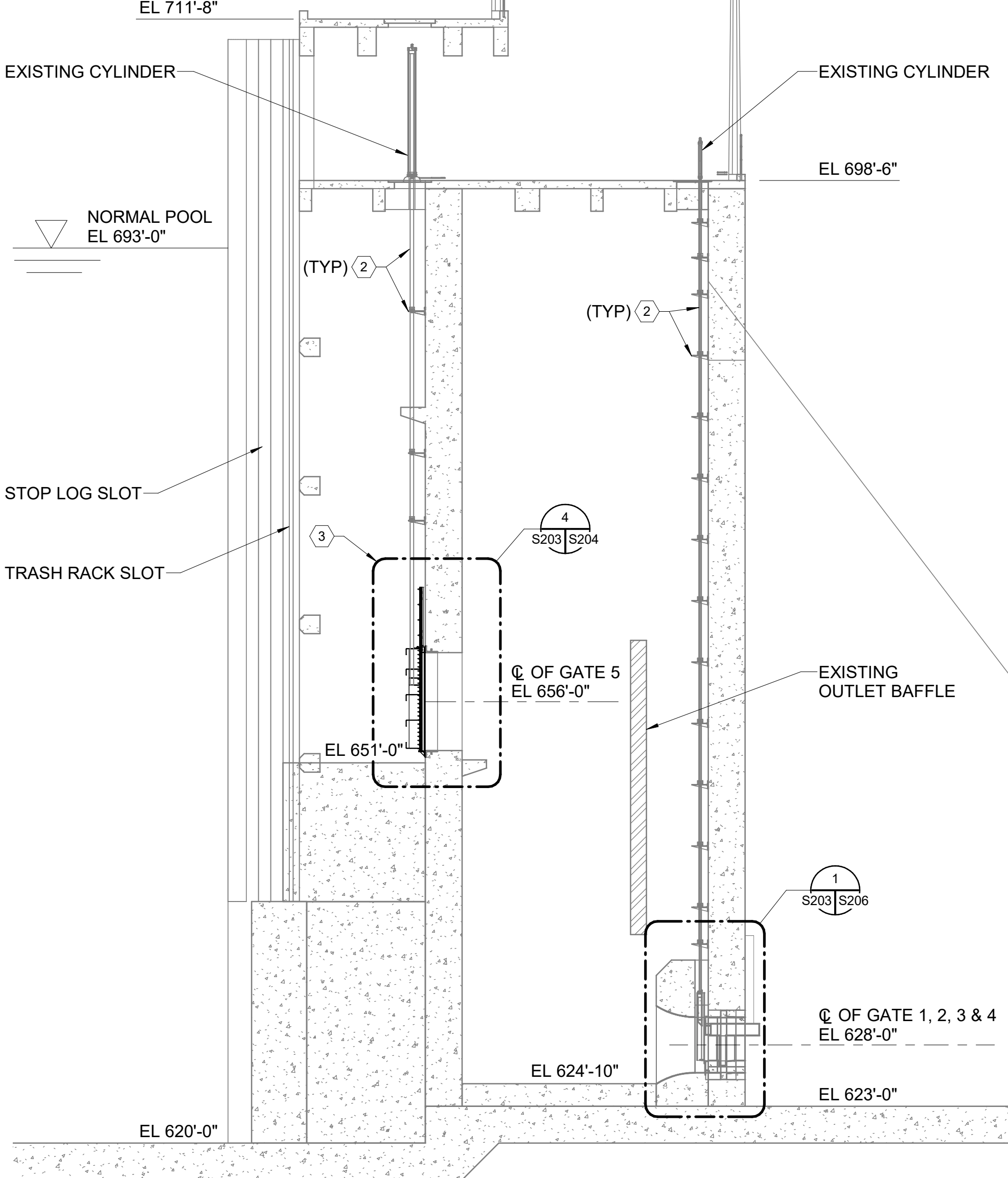
1. THESE NOTES APPLY TO THE REMOVAL AND REPLACEMENT OF THE EXISTING LADDER CENTER SAFETY RAILS WITHIN THE NORTH AND SOUTH UPSTREAM WELLS.
2. REMOVE AND DISPOSE OF THE EXISTING NON-STAINLESS STEEL AND DAMAGED CENTER SAFETY RAILS AND SUPPORTING EQUIPMENT FROM THE EXISTING LADDER RUNGS.
3. THE NEW CENTER SAFETY RAILS AND SUPPORTING EQUIPMENT SHALL BE 316 STAINLESS STEEL AND COMPATIBLE WITH THE EXISTING FALL ARRESTOR SYSTEM (MILLER GLIDELOC™ VERTICAL ACCESS LADDER SYSTEM KITS).
4. BEFORE ORDERING THE NEW CENTER SAFETY RAILS, VERIFY EXISTING DIMENSIONS AND EXISTING FALL ARRESTOR SYSTEM THE OWNER USES AND SUBMIT FOR REVIEW AND ACCEPTANCE A SUBMITTAL IN ACCORDANCE WITH SPECIFICATION SECTION 01 33 00 - SUBMITTAL PROCEDURES OF THE PROPOSED REPLACEMENT CENTER SAFETY RAIL SYSTEM INCLUDING LENGTH/QUANTITY AND ATTACHMENT DETAILS TO THE EXISTING LADDER RUNGS.

STAINLESS STEEL FIELD CLEANING AND PASSIVATION NOTES:

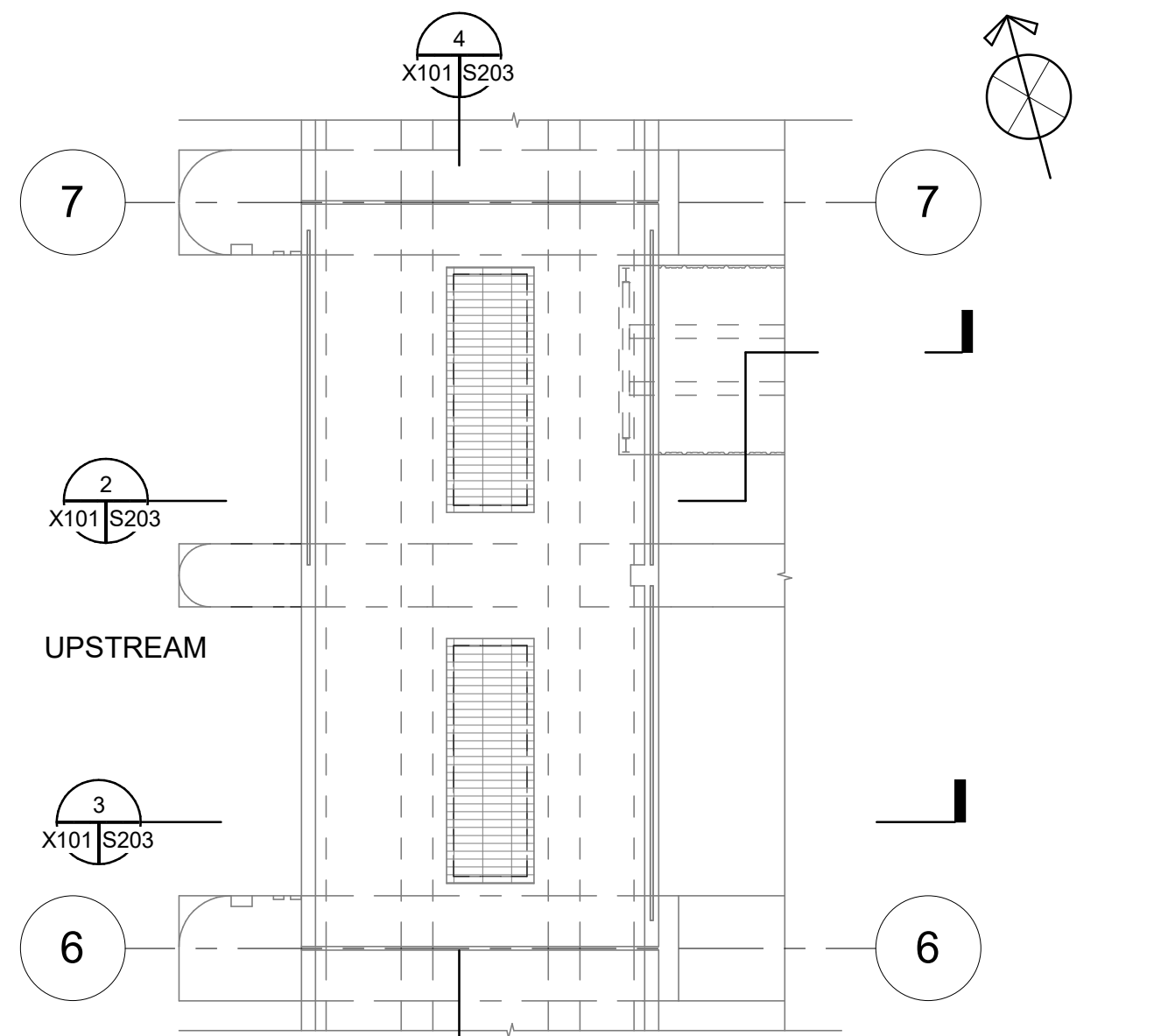
1. THESE NOTES APPLY TO FIELD CLEANING AND PASSIVATION OF STAINLESS STEEL ONLY. SEE SPECIFICATION SECTION 05 50 00 - METAL FABRICATION AND SECTION 35 22 26 - SLIDE GATES FOR ADDITIONAL REQUIREMENTS.
2. BEFORE ORDERING THE CLEANING PRODUCTS, THE CONTRACTOR SHALL SUBMIT FOR REVIEW AND ACCEPTANCE A SUBMITTAL IN ACCORDANCE WITH SPECIFICATION SECTION 01 33 00 - SUBMITTAL PROCEDURES OF THE PROPOSED PRODUCTS AND PROCEDURES FOR CLEANING AND PASSIVATING STAINLESS STEEL.
3. THE MINIMUM REQUIREMENTS INCLUDE:
 - 3.1 USE AN ACID-BASED STAINLESS STEEL CLEANING PRODUCT (CitriSurf® 2210 OR APPROVED EQUAL) MEETING THE REQUIREMENTS OF ASTM A380 OR ASTM A967 IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS.
 - 3.2 PRE-RINSE STAINLESS STEEL WITH WARM WATER.
 - 3.3 USE A DROP CLOTH OR OTHER MEANS AROUND THE BASE OF THE WORK AREA SUFFICIENT TO PREVENT CONTAMINATION OF THE STRUCTURE OR DOWNSTREAM AREA FROM EXCESS CLEANING PRODUCTS.
 - 3.4 SWAB THE APPROVED ACID-BASED SOLUTION OVER THE AREA WITH A SMALL CLEAN CLOTH OR SPONGE AND LET STAND FOR AT LEAST 30 MINUTES. FOR HEAVILY STAINED AND CONTAMINATED AREAS, ALLOW THE SOLUTION TO STAND FOR ADDITIONAL TIME (1 - 2 HOURS OR MORE).
 - 3.5 CLEAN ENTIRE SURFACES AS NECESSARY USING A COMPATIBLE CLEANING PAD (SCOTCH-BRITE™ 3M # 8447 OR APPROVED EQUAL).
 - 3.6 RINSE WITH CLEAN WARM WATER AND WIPE SURFACES CLEAN WITH CLEAN SOFT CLOTH.
 - 3.7 REPEAT AS NEEDED.



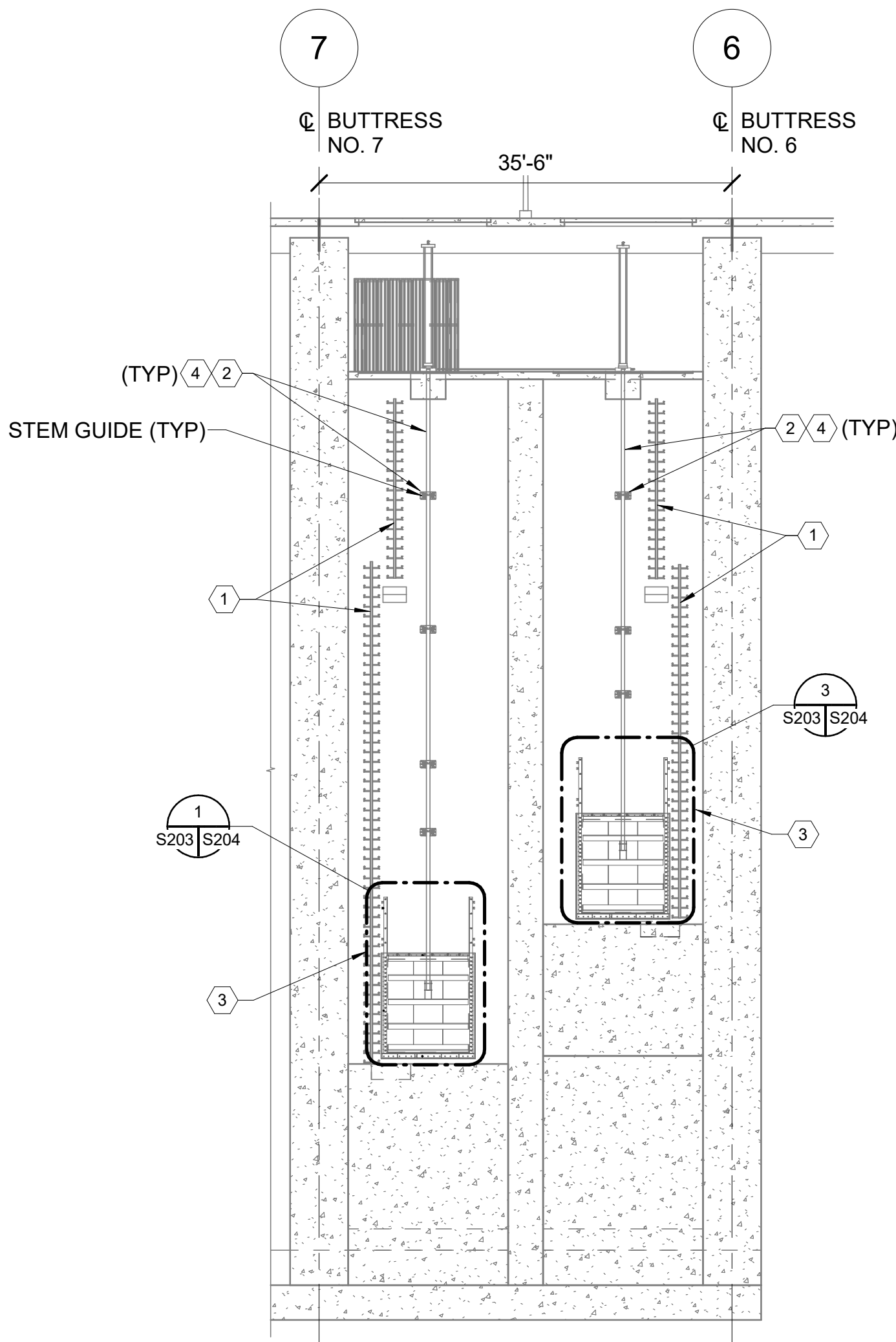
2 NORTH BAY SECTION (GATE 6)
X101 SCALE: 1/8" = 1'-0"



3 SOUTH BAY SECTION (GATE 5)
X101 SCALE: 1/8" = 1'-0"



1 SECTION KEY PLAN
S203 SCALE: 1/8" = 1'-0"



4 ELEVATION
S203 SCALE: 3/32" = 1'-0"

REV	DESCRIPTION	BY	DATE

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RFB NO: 21-05-1219

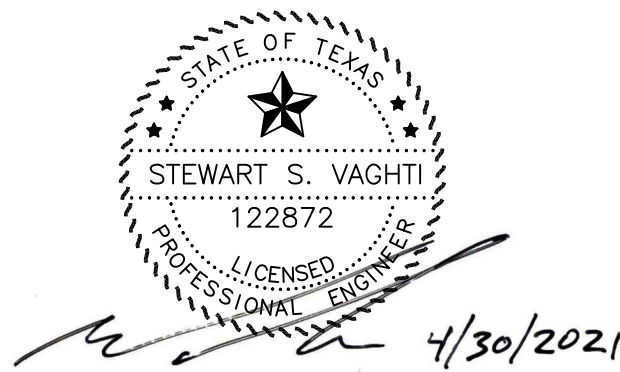
DRAWN BY: DJB

DESIGNED BY: SSV

REVIEWED BY: DLR

APPROVED BY:

DATE: 4/30/2021



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DE CORDOVA BEND DAM
LOW FLOW OUTLET WORKS REPAIR PROJECT
NORTH AND SOUTH BAY SECTIONS AND ELEVATION

BRA FILE NO.:
DWG LABEL:
_S_central_R19.rvt

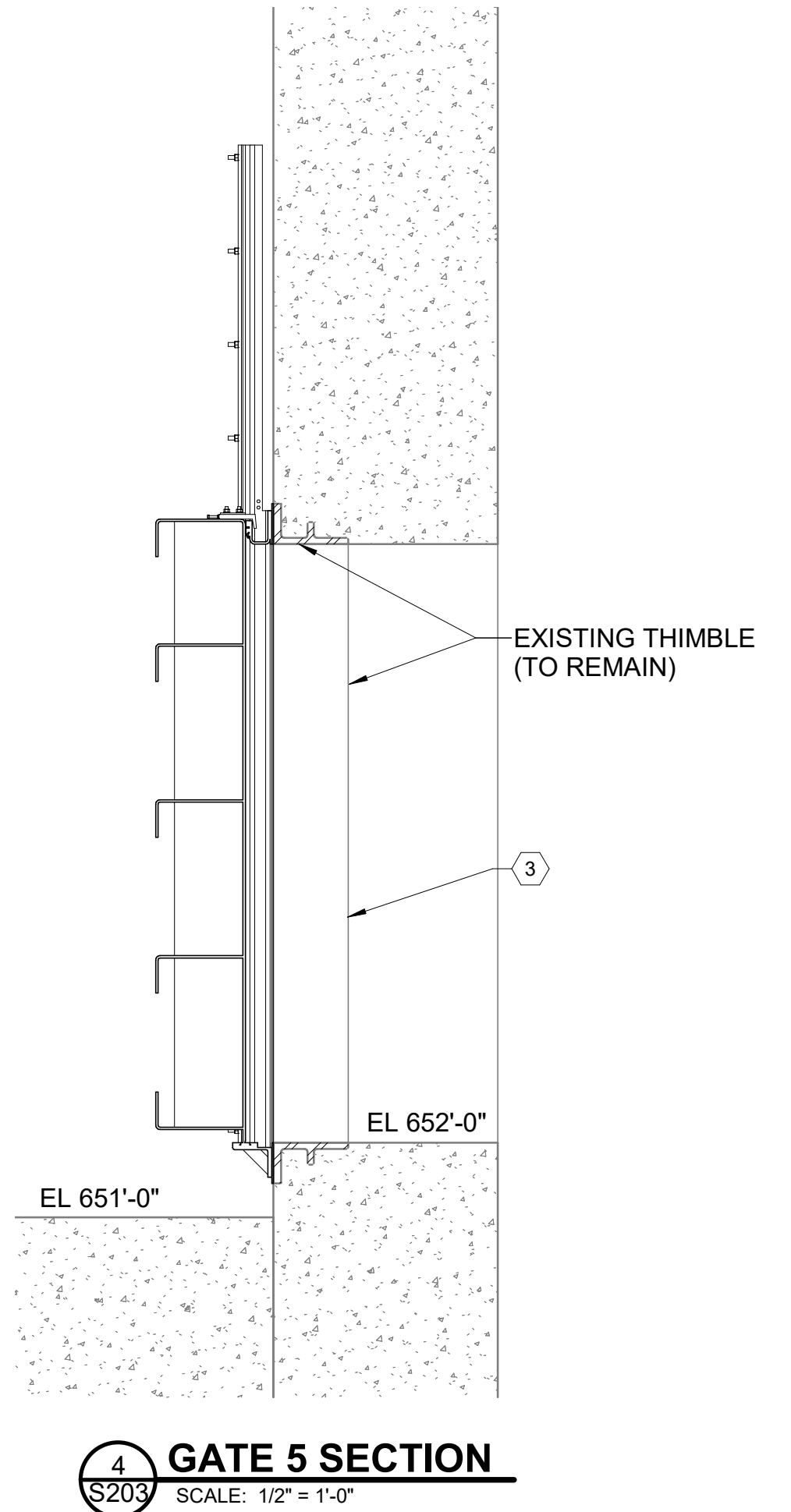
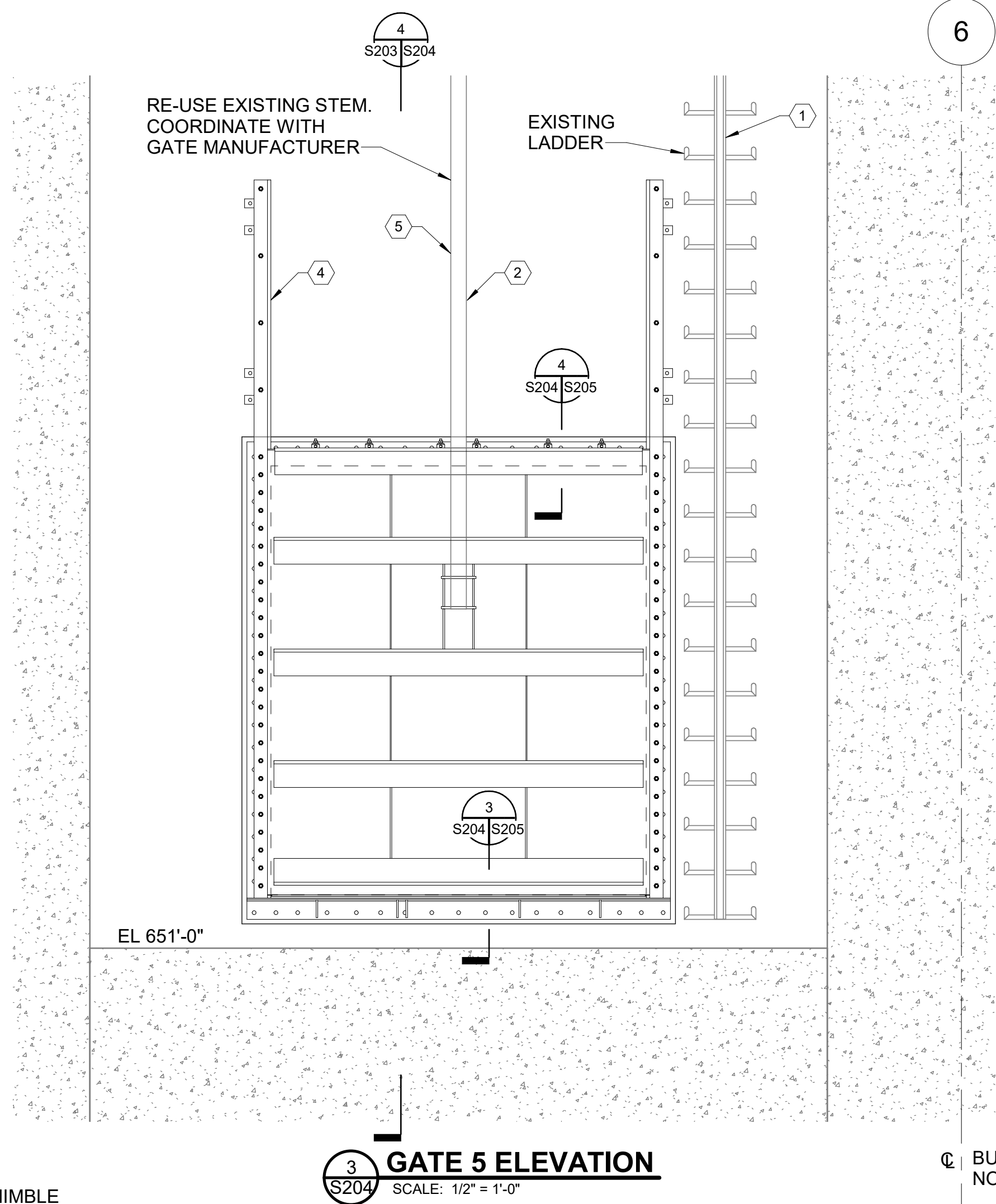
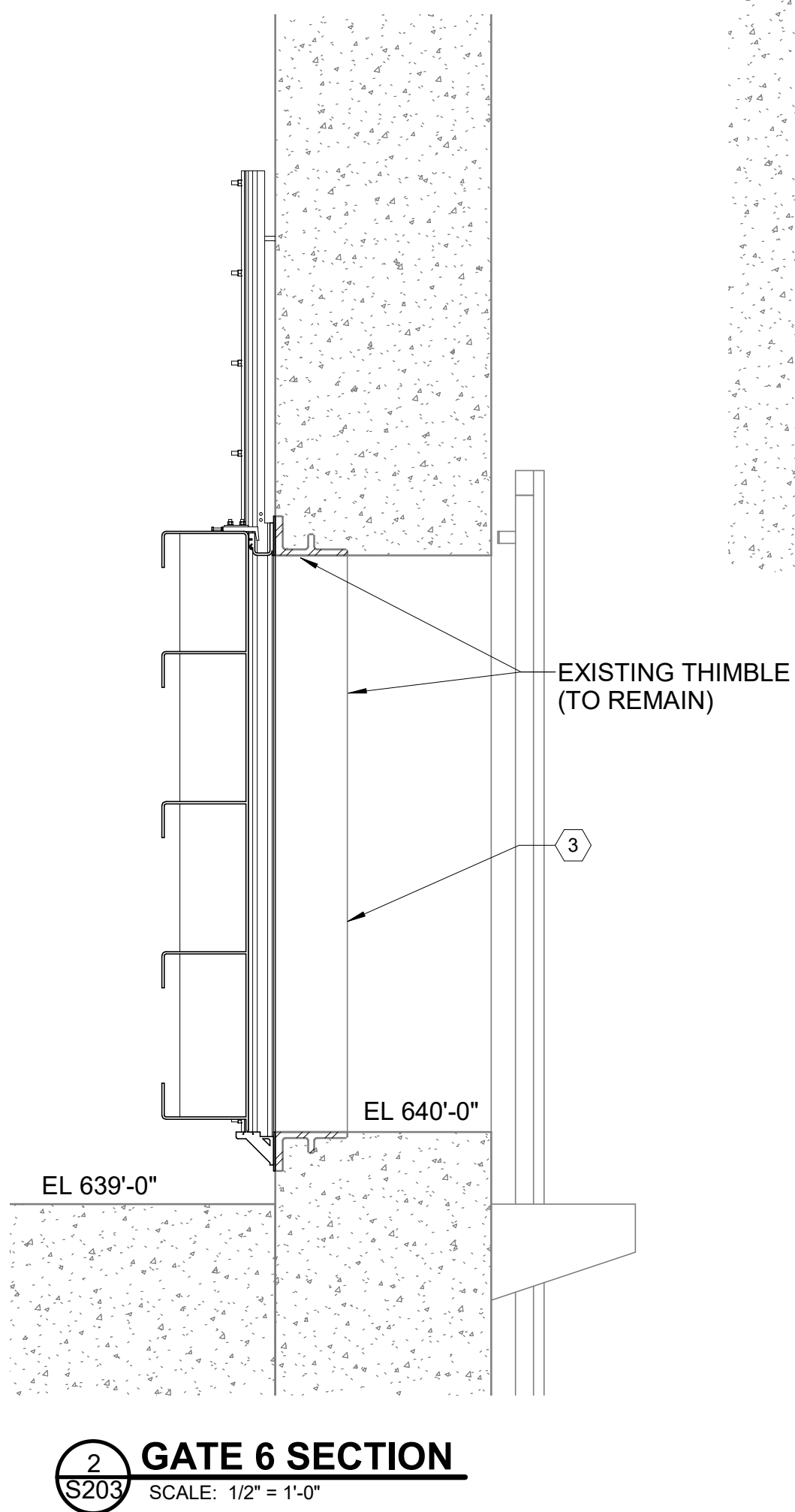
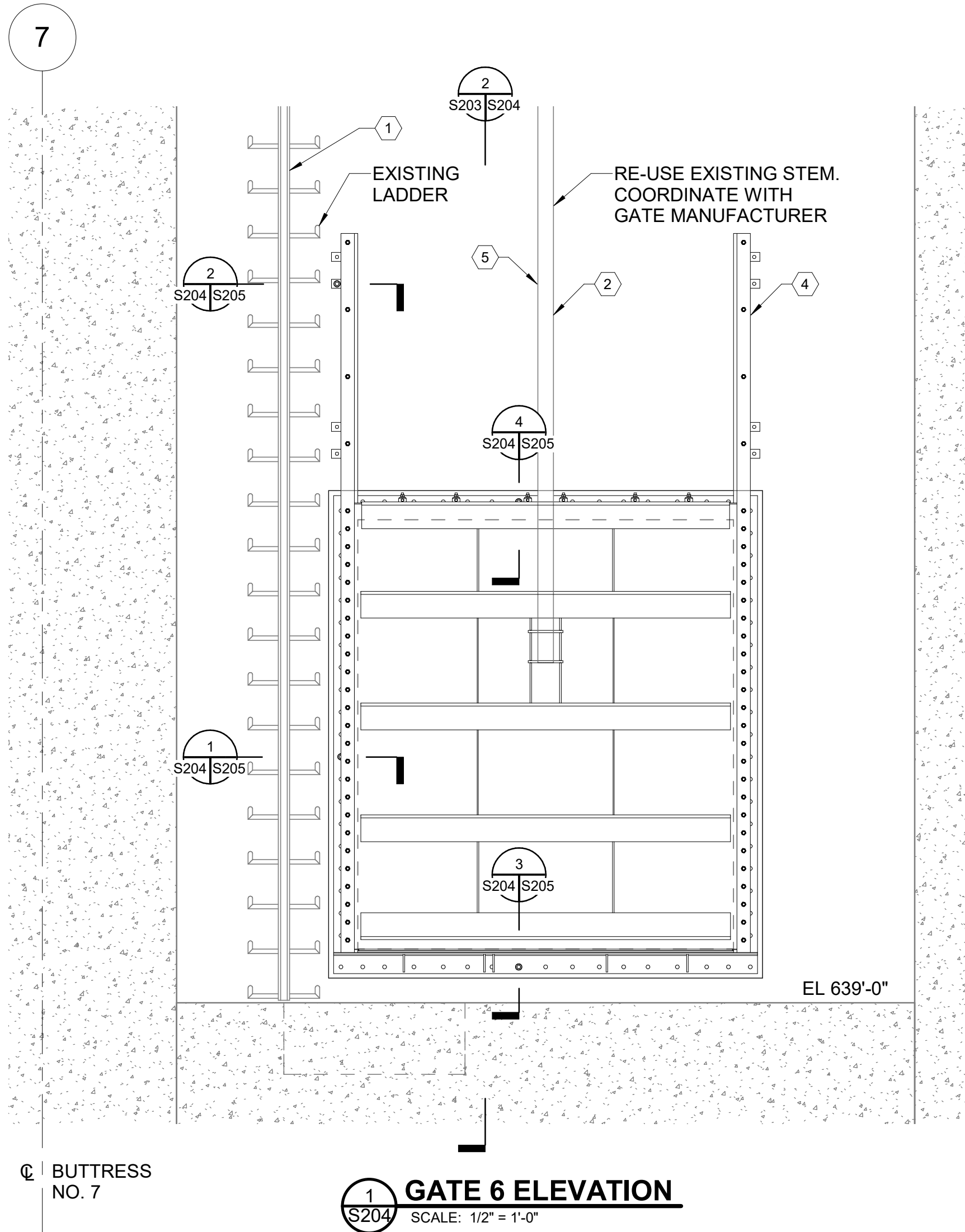
DRAWING NO.
S203

SHEET NO. 6

Project Number: 21-05-1219
5/3/2021 6:14:11 AM
Local File: BIM 360//066396 - De Cordova Low Flow/66396_Central_R20_BIM360.rvt
S_central_R19.rvt

SHEET NOTES:

- 1 REPLACE EXISTING NON-STAINLESS STEEL (E.G. ALUMINUM) CENTER SAFETY RAILS AND SUPPORTING EQUIPMENT (E.G. RUNG CLAMPS) WITH 316 STAINLESS STEEL CENTER SAFETY RAILS COMPATIBLE WITH THE EXISTING FALL ARRESTOR SYSTEM (MILLER GLIDELOC™ VERTICAL ACCESS LADDER SYSTEM KITS). VERIFY LENGTH/QUANTITY OF NON-STAINLESS RAILS TO BE REPLACED AND INCLUDE IN SUBMITTAL BEFORE ORDERING MATERIALS.
- 2 CLEAN AND TREAT EXISTING STAINLESS STEEL GATE STEMS AND STEM GUIDES FOR GATES 1, 2, 3, 4, 5 AND 6 IN ACCORDANCE WITH THE STAINLESS STEEL FIELD CLEANING AND PASSIVATION NOTES ON DRAWING S203 (SHEET 6).
- 3 RE-COAT PREVIOUSLY COATED CAST-IRON THIMBLE. SEE ALSO PROJECT SPECIFICATIONS.
- 4 INSTALL AND TEST NEW 316 STAINLESS STEEL SLIDE GATE. SEE GATES 5 & 6 REPLACEMENT NOTES AND PROJECT SPECIFICATIONS.
- 5 CHECK AND MAKE ADJUSTMENTS TO GATE 5 & 6 GUIDES, STEMS, STEM GUIDE FASTENERS FOR TIGHTNESS AND ALIGNMENT FOR A PROPERLY-FUNCTIONING GATE AND SECURE/REPLACE/ADJUST AS NECESSARY.



GATES 5 & 6 REPLACEMENT NOTES:

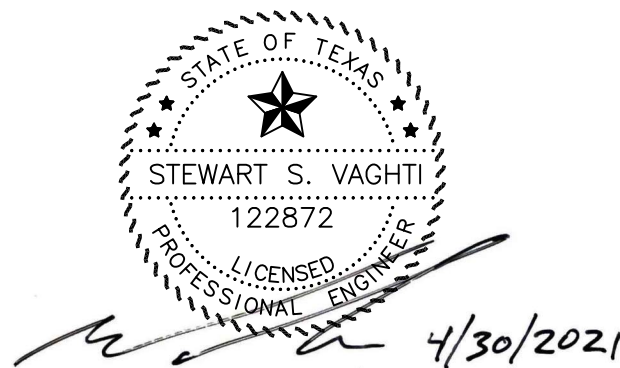
1. REPLACEMENT GATES, FRAMES AND ACCESSORIES ARE NEW STAINLESS STEEL GATES PER AWWA C561 SUPPLIED BY HYDRO GATE.
2. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING ALL EXISTING CONDITIONS AND DIMENSIONS NECESSARY TO COMPLETE THE WORK INCLUDING REUSING EXISTING STAINLESS STEEL GATE STEMS, STEM GUIDES, AND THIMBLES.
3. PERFORM GATE FRAME INSTALLATION ONLY AFTER RECOATING OF THIMBLES IS COMPLETE, READY FOR THE NEW GATE FRAMES, AND THE ENGINEER HAS INSPECTED WITHOUT ISSUES THE COATING AREAS TO BE COVERED BY THE GATE FRAME.
4. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTING THE NEW GATES 5 & 6 FROM DAMAGE AND SURFACE CONTAMINATION DURING HANDLING AND INSTALLATION INCLUDING FERROUS CONTAMINATION. AREAS WITH EVIDENCE OF CONTAMINATION, DISRUPTION OF THE PASSIVE FILM AND / OR SURFACE OXIDATION SHALL BE PROPERLY CLEANED AND TREATED AT NO ADDITIONAL COST TO THE PROJECT IN ACCORDANCE WITH ASTM A380 AND ASTM SPECIAL TECHNICAL PUBLICATION 538.
5. SEE TECHNICAL SPECIFICATIONS FOR ADDITIONAL INFORMATION.

REV	DESCRIPTION	BY	DATE

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DESIGNED BY: SSV
REVIEWED BY: DLR
APPROVED BY:
DATE: 4/30/2021



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DE CORDOVA BEND DAM
LOW FLOW OUTLET WORKS REPAIR PROJECT
NEW GATE 5 & 6 ELEVATIONS AND SECTIONS

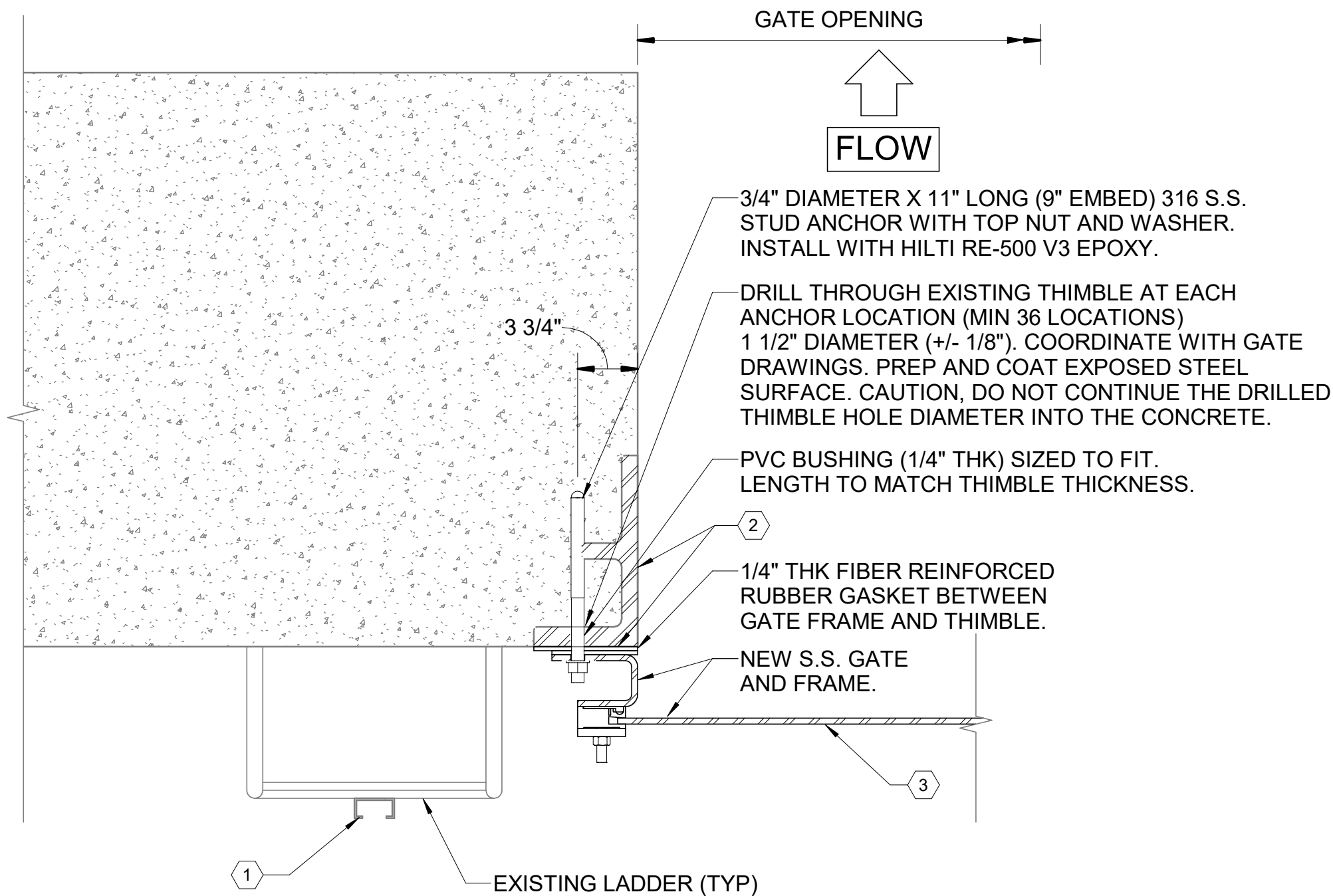
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DWG LABEL: _S_central_R19.rvt	SHEET NO. 7

GATE FRAME ANCHORAGE NOTE:

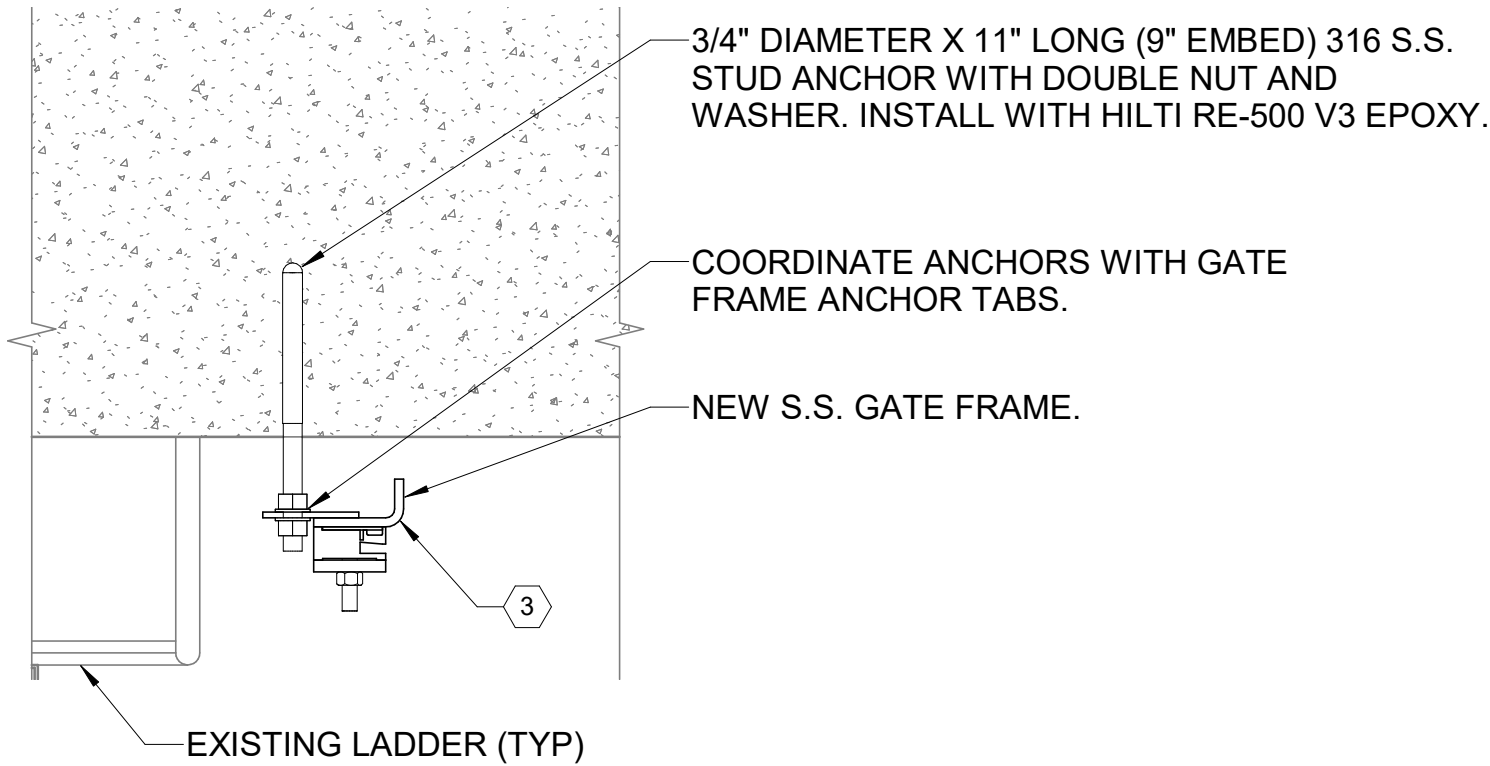
1. CONTRACTOR IS RESPONSIBLE FOR COORDINATING GATE FRAME ANCHORAGE WITH THE GATE MANUFACTURER HYDRO GATE.
2. PROVIDE A MINIMUM OF 36 FRAME ANCHORS SPACED NO GREATER THAN 12 INCHES APART ON ALL SIDES. DRAWINGS SHOW NEW ANCHORS THROUGH THE EXISTING THIMBLE WITH PVC ISOLATION BUSHINGS TO ADDRESS DIFFERENTIAL METALS. THE CONTRACTOR MAY SUBMIT AN ALTERNATE ATTACHMENT DETAIL FOR REVIEW IN ACCORDANCE WITH SUBSTITUTION REQUIREMENTS OUTLINED IN SPECIFICATION SECTION 01 33 00 - SUBMITTAL PROCEDURES.
4. PERFORM GATE FRAME INSTALLATION AFTER RECOATING OF THIMBLES IS COMPLETE AND ACCEPTED.
5. FIELD LOCATE EXISTING REINFORCING, SUBMIT DIMENSIONED PLAN, AND COORDINATE WITH GATE VENDOR PRIOR TO GATE FABRICATION. REINFORCING RECORD DRAWING PROVIDED FOR REFERENCE ONLY.
6. SEE PROJECT SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

SHEET NOTES:

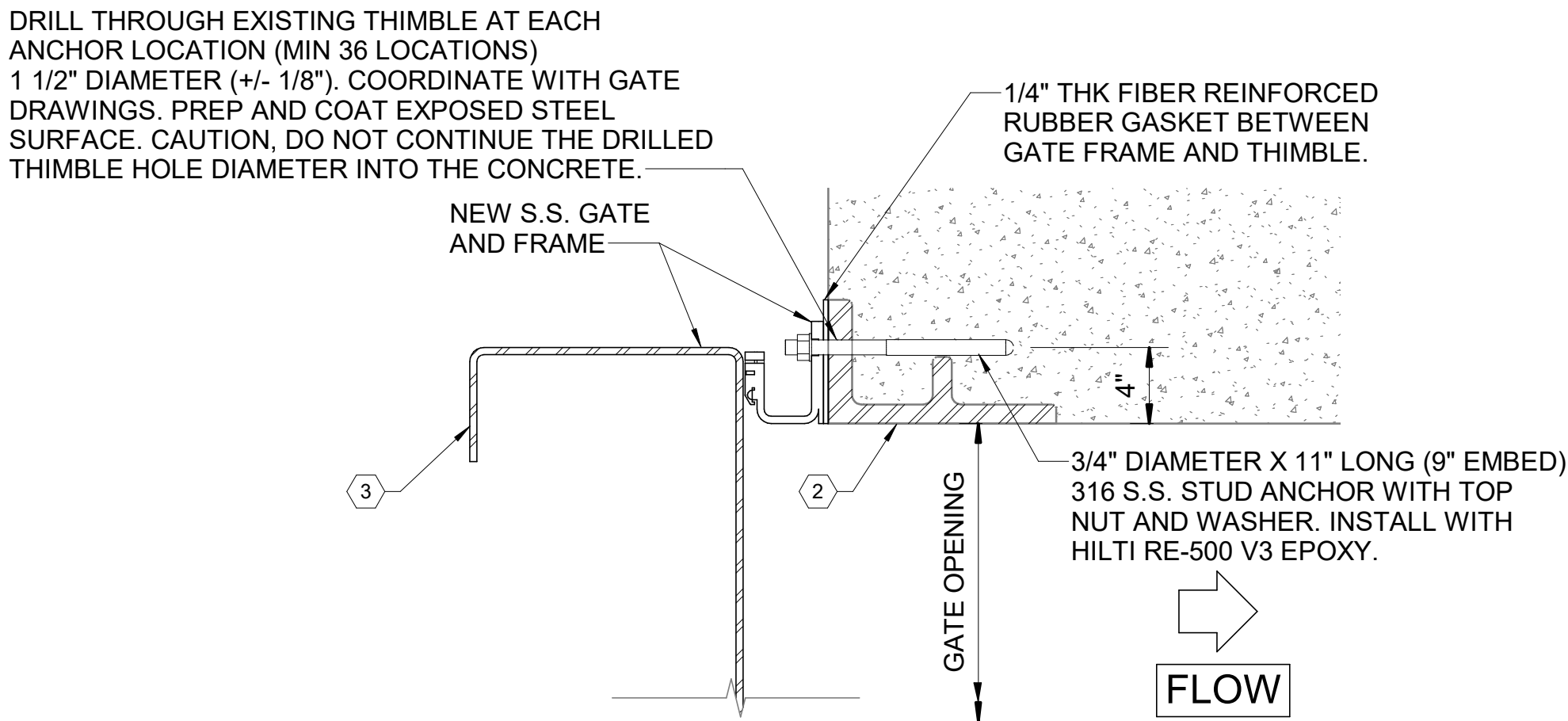
1. REPLACE EXISTING NON-STAINLESS STEEL (E.G. ALUMINUM) CENTER SAFETY RAILS AND SUPPORTING EQUIPMENT (E.G. RUNG CLAMPS) WITH 316 STAINLESS STEEL CENTER SAFETY RAILS COMPATIBLE WITH THE EXISTING FALL ARRESTOR SYSTEM (MILLER GLIDELOC™ VERTICAL ACCESS LADDER SYSTEM KITS). VERIFY LENGTH/QUANTITY OF NON-STAINLESS RAILS TO BE REPLACED AND INCLUDE IN SUBMITTAL BEFORE ORDERING MATERIALS.
2. RE-COAT PREVIOUSLY COATED CAST-IRON THIMBLE. SEE ALSO PROJECT SPECIFICATIONS.
3. INSTALL AND TEST NEW 316 STAINLESS STEEL SLIDE GATE. SEE GATES 5 & 6 REPLACEMENT NOTES AND PROJECT SPECIFICATIONS.



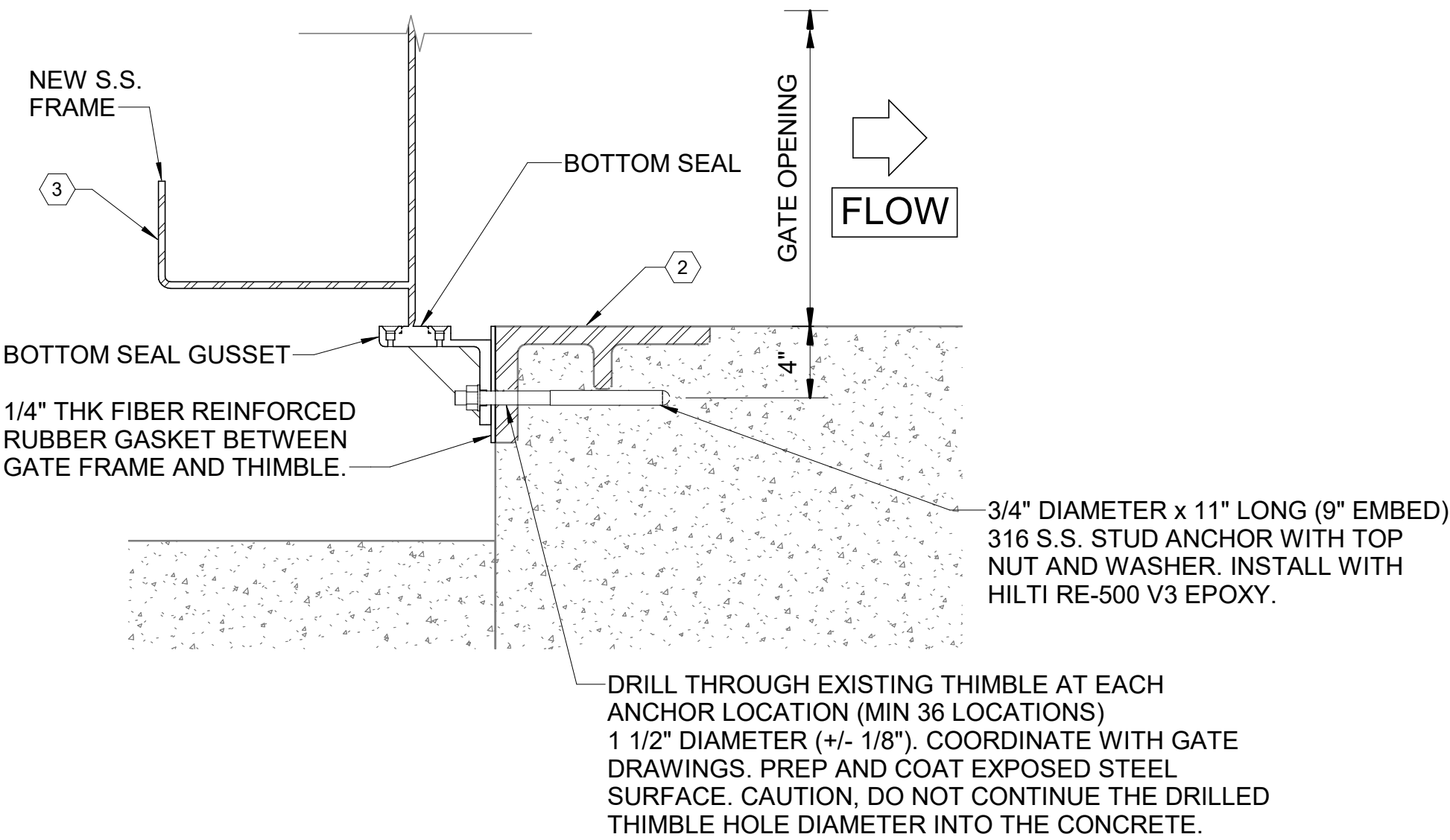
1
S204
SCALE: 1 1/2" = 1'-0"



2
S205
SCALE: 1 1/2" = 1'-0"



4
S204
SCALE: 1 1/2" = 1'-0"



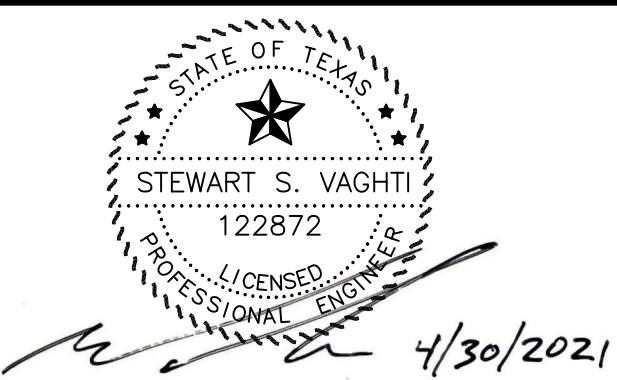
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S205
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DESIGNED BY:	SSV
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APPROVED BY:	
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DE CORDOVA BEND DAM
LOW FLOW OUTLET WORKS REPAIR PROJECT
NEW GATE 5 & 6 DETAILS

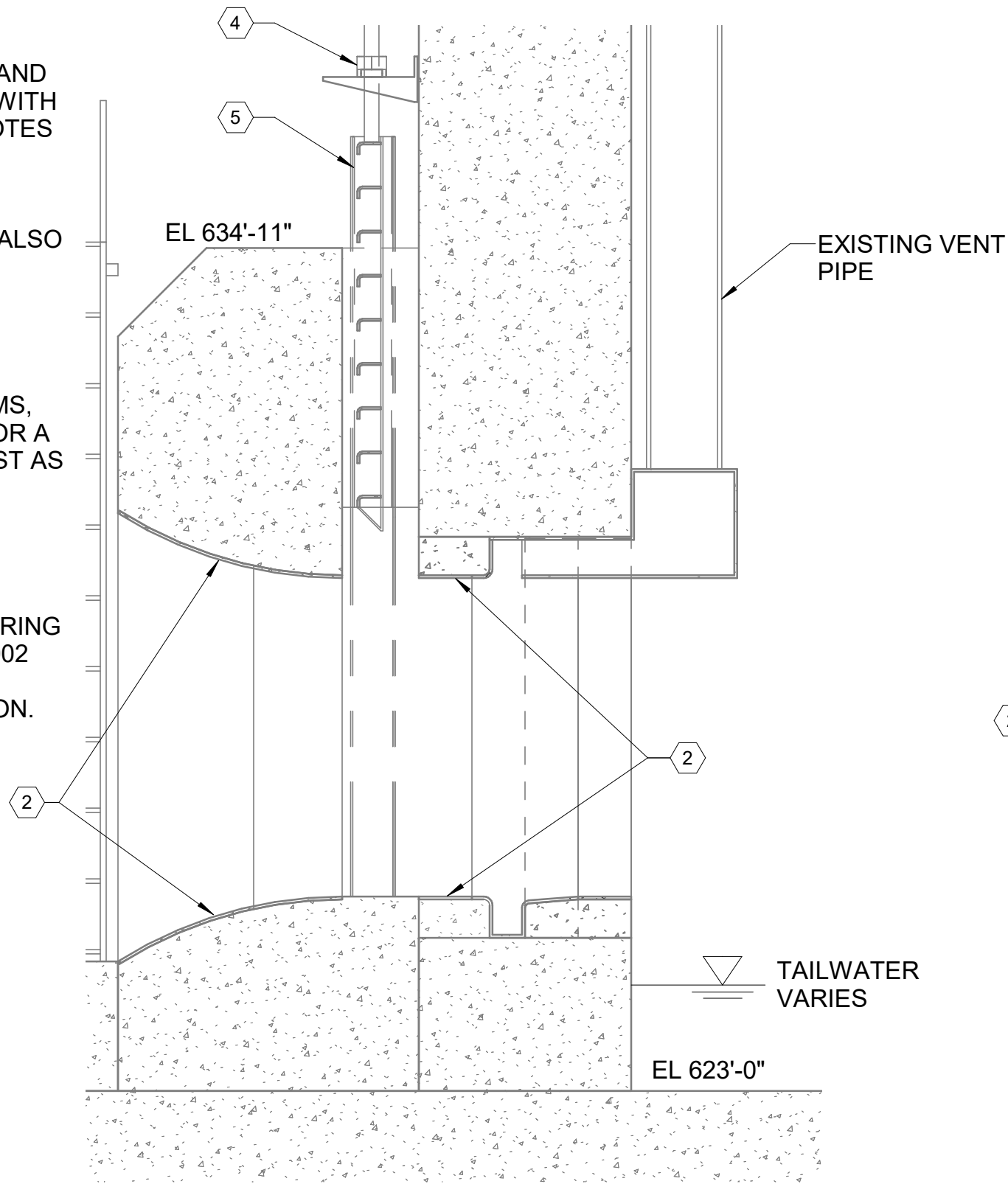
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DWG LABEL: _S_central_R19.rvt	SHEET NO. 8

GATE 3 GUIDE/SEAL REPLACEMENT NOTES:

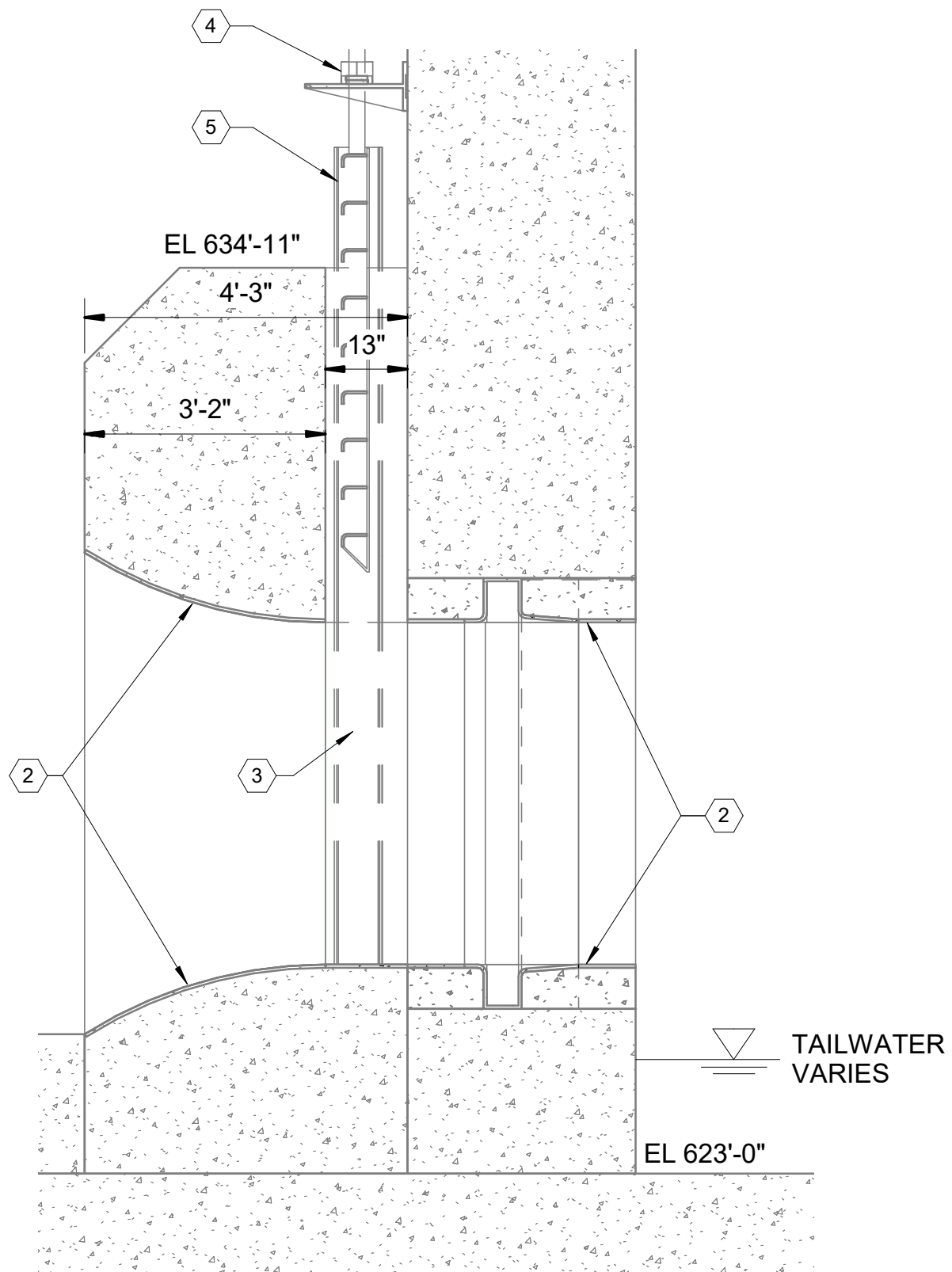
1. THE RIGHT GUIDE/SEAL ASSEMBLY HAS COME LOOSE FROM THE FRAME AND DOES NOT SEAL PROPERLY.
2. THE CONTRACTOR SHALL REMOVE GATE 3 FROM THE FRAME AND NOTIFY THE ENGINEER FOR AN INSPECTION OF THE GUIDE/SEAL ASSEMBLIES.
3. SUBJECT TO APPROVAL OF THE ENGINEER, GUIDE/SEAL ASSEMBLIES THAT ARE SECURE AND IN GOOD CONDITION CAN REMAIN. GUIDE/SEAL ASSEMBLIES THAT ARE LOOSE, FAULTY, OR INOPERABLE SHALL BE REPAIRED AND/OR REPLACED SUBJECT TO APPROVAL OF THE ENGINEER.
4. BEFORE ORDERING ANY REPLACEMENT PARTS, THE CONTRACTOR SHALL SUBMIT FOR REVIEW AND ACCEPTANCE A SHOP DRAWING IN ACCORDANCE WITH SPECIFICATION SECTION 01 33 00 - SUBMITTAL PROCEDURES OF THE PROPOSED REPLACEMENT PARTS AND REPLACEMENT PROCEDURE(S). IN ADDITION TO THE NEW GUIDE/SEAL ASSEMBLIES, THE SUBMITTAL SHALL IDENTIFY WHICH GUIDE/SEAL ASSEMBLIES ARE TO REMAIN (IF ANY) AND ANY ADDITIONAL SECURING/REPLACEMENT OF SCREWS/FASTENERS (IF ANY).
5. MINIMUM MANUFACTURER INSTALLATION REQUIREMENTS INCLUDE:
 - 5.1 - SEAL ATTACHMENT SCREWS SHOULD BE INSTALLED WITH LOCTITE OR OTHER THREAD LOCKER PRODUCT.
 - 5.2 - SEAL ATTACHMENT SCREWS SHALL BE INSTALLED SUCH THAT THE HEAD IS RECESSED WITHIN THE UHMW PLASTIC GUIDE BAR.
 - 5.3 - APPLY A THIN LAYER OF MARINE GRADE POLYURETHANE SEALANT BETWEEN THE J-BULB SEAL AND THE FRAME AND AT THE CORNERS WHERE THE J-BULB SEAL MEETS THE FLUSH BOTTOM SEAL.
 - 5.4 - CARE SHOULD BE TAKEN WHEN RE-INSERTING/RE-ENGAGING THE SLIDE PLATE TO ENSURE THE J-BULB SEAL IS NOT CAUGHT OR TORN.
 - 5.5 - APPLY VEGETABLE OIL OR SIMILAR LUBRICANT TO J-BULB SEAL CONTACT SURFACE.
6. REPLACEMENT PARTS SHALL BE NEW SOURCED FROM SEALS UNLIMITED (www.sealsunlimited.com) NO EXCEPTIONS AND COORDINATED WITH THE GATE MANUFACTURER HYDRO GATE (SEE SPECIFICATION SECTION 35 22 26-SLIDE GATES FOR CONTACT INFORMATION).
7. TOTAL SLIDE GATE LEAKAGE BETWEEN LEAF AND SEATS/SEALS/SILL TO BE A MAXIMUM OF 0.10 GALLON PER MINUTE PER LINEAL FOOT OF SEAL PERIMETER. THE CONTRACTOR SHALL PERFORM LEAK TESTS UNDER FULL HEAD LOADING CONDITIONS AND MAKE ANY NECESSARY ADJUSTMENTS AND CORRECTIONS TO THE SEALS NEEDED TO MEET LEAKAGE REQUIREMENTS.
8. DRY TEST AND WET TEST GATE AND MAKE ANY NECESSARY ADJUSTMENTS AND CORRECTIONS. SEE SPECIFICATION SECTION 41 24 26 - HYDRAULIC POWER UNIT FOR GATE TESTING REQUIREMENTS.
9. SEE DRAWING R006 (SHEET 18) FOR GATE 3 RECORD DRAWING (FOR REFERENCE ONLY).

SHEET NOTES:

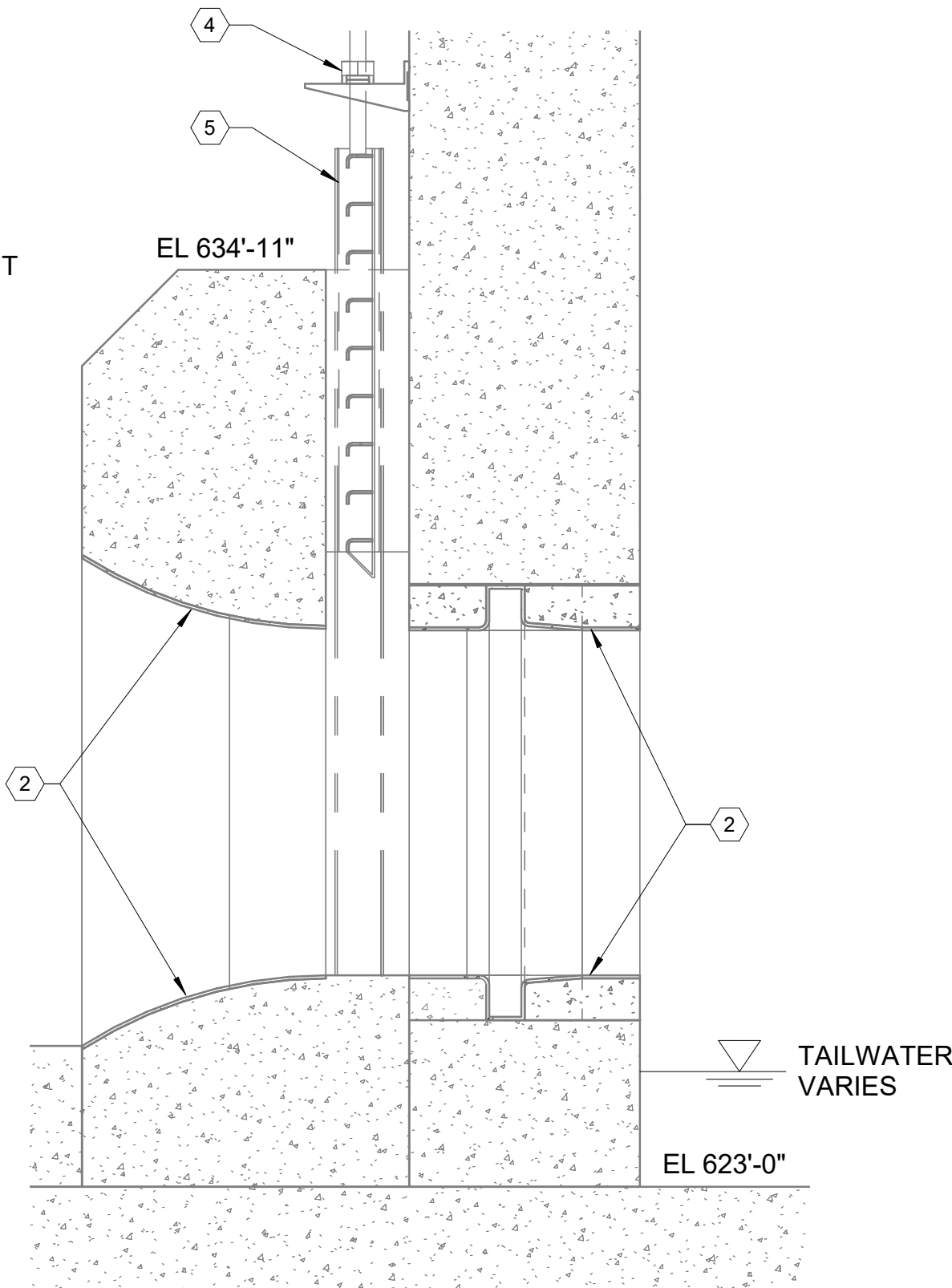
- 1 CLEAN AND TREAT EXISTING STAINLESS STEEL GATE STEMS AND STEM GUIDES FOR GATES 1, 2, 3, 4, 5 AND 6 IN ACCORDANCE WITH THE STAINLESS STEEL FIELD CLEANING AND PASSIVATION NOTES ON DRAWING S203 (SHEET 6). SEE ALSO PROJECT SPECIFICATIONS.
- 2 RE-COAT PREVIOUSLY COATED THIMBLE AND CONDUIT. SEE ALSO PROJECT SPECIFICATIONS.
- 3 REPLACE GATE 3 GUIDES AND SEALS (NEW). SEE GATE 3 GUIDE/SEAL REPLACEMENT NOTES THIS SHEET.
- 4 CHECK AND MAKE ADJUSTMENTS TO GATE 1 - 4 GUIDES, STEMS, STEM GUIDE FASTENERS FOR TIGHTNESS AND ALIGNMENT FOR A PROPERLY-FUNCTIONING GATE AND SECURE/REPLACE/ADJUST AS NECESSARY. SEE ALSO PROJECT SPECIFICATIONS.
- 5 TEST STAINLESS STEEL SLIDE GATES. SEE PROJECT SPECIFICATIONS.
- 6 PROVIDE TEMPORARY HUMIDITY AND TEMPERATURE MONITORING UNITS DURING CONSTRUCTION. SEE DETAIL 2 ON DRAWING I002 (SHEET 13) AND SPECIFICATION SECTION 01 32 36.10 - VIDEO TEMPERATURE & HUMIDITY MONITORING AND DOCUMENTATION.



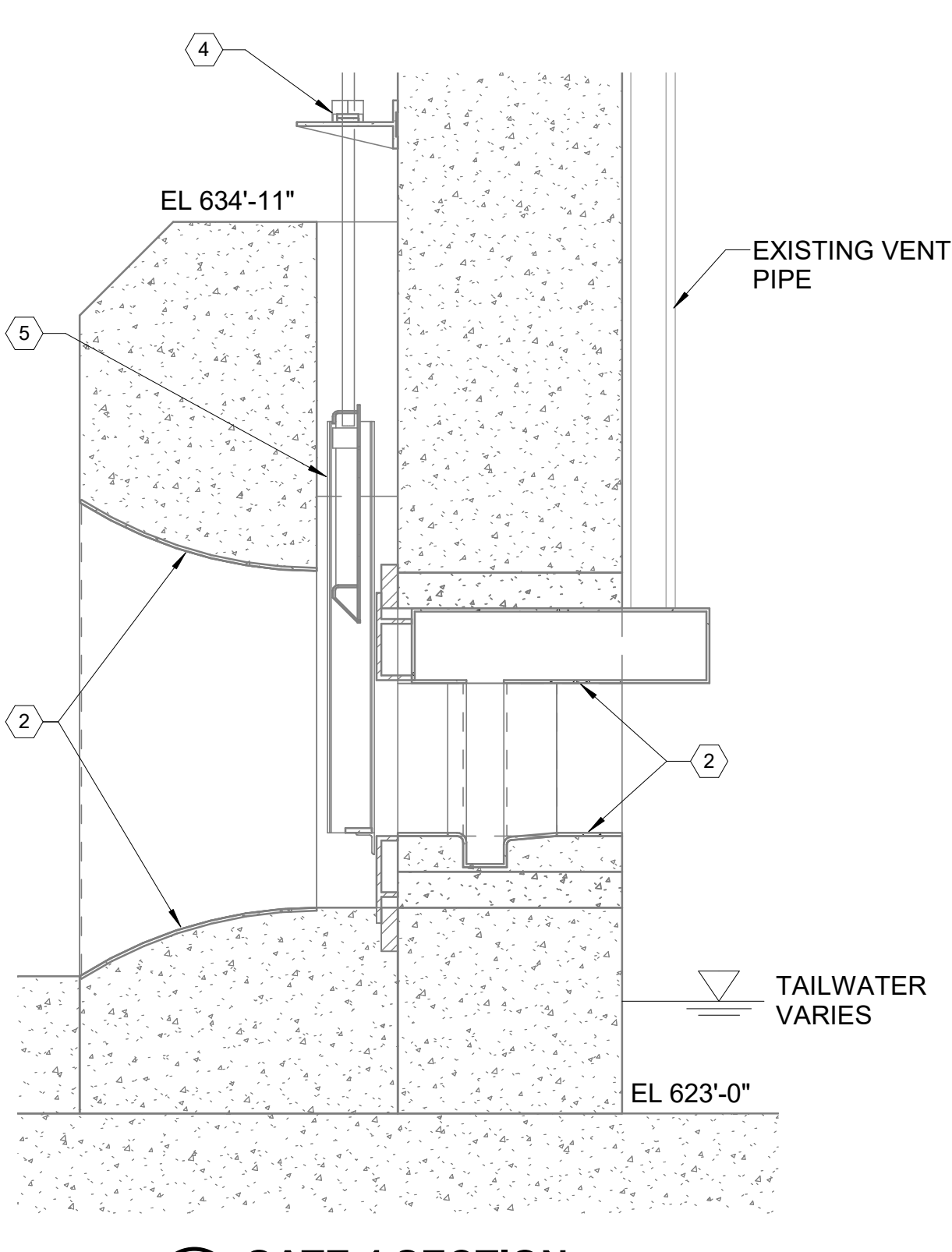
3 GATE 1 SECTION
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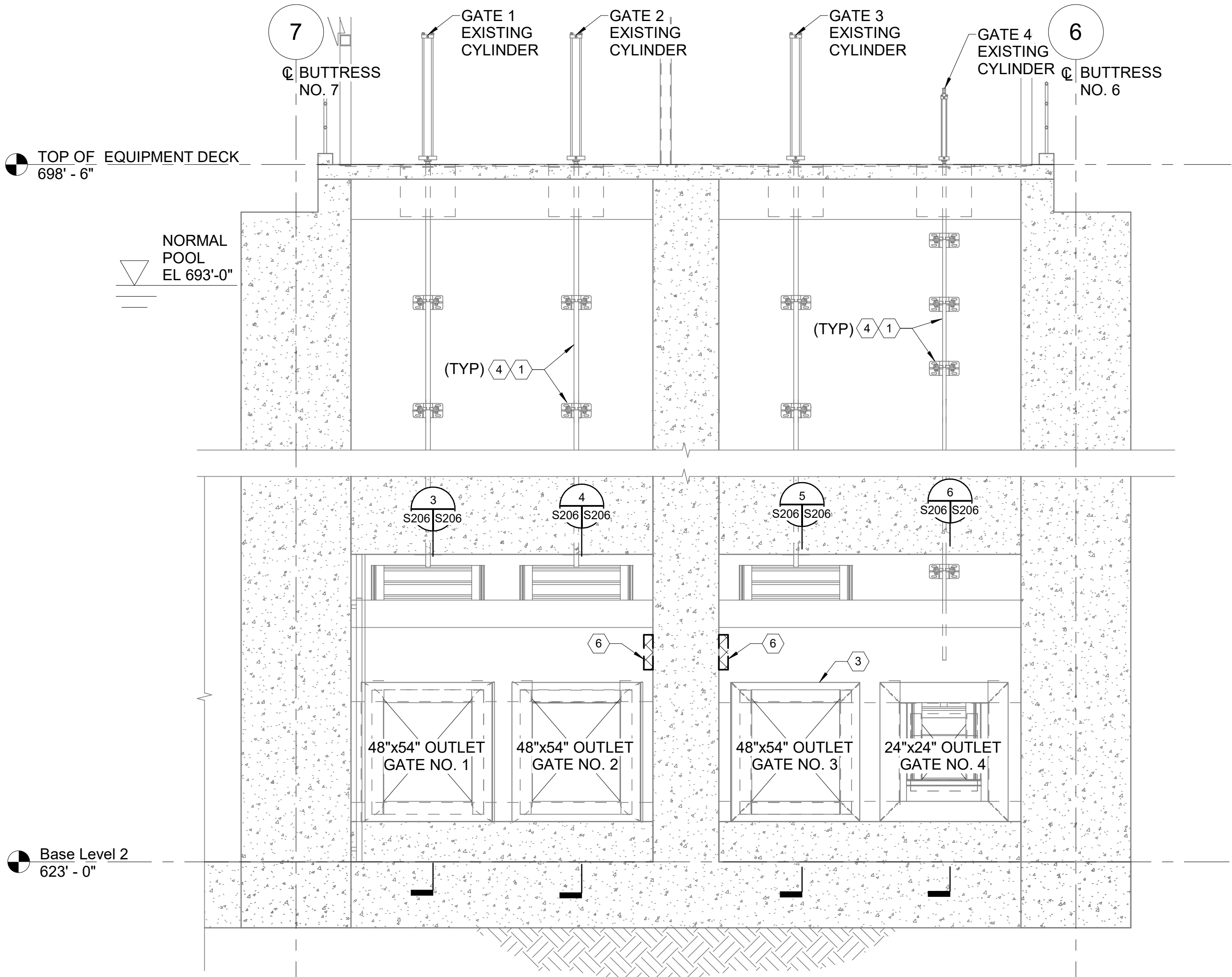
5 GATE 3 SECTION
S206 SCALE: 1/2" = 1'-0"



4 GATE 2 SECTION
S206 SCALE: 1/2" = 1'-0"



6 GATE 4 SECTION
S206 SCALE: 1/2" = 1'-0"



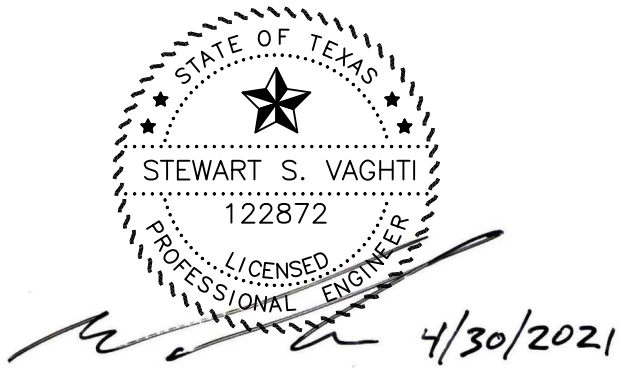
1 UPSTREAM ELEVATION
S206 SCALE: 1/4" = 1'-0"

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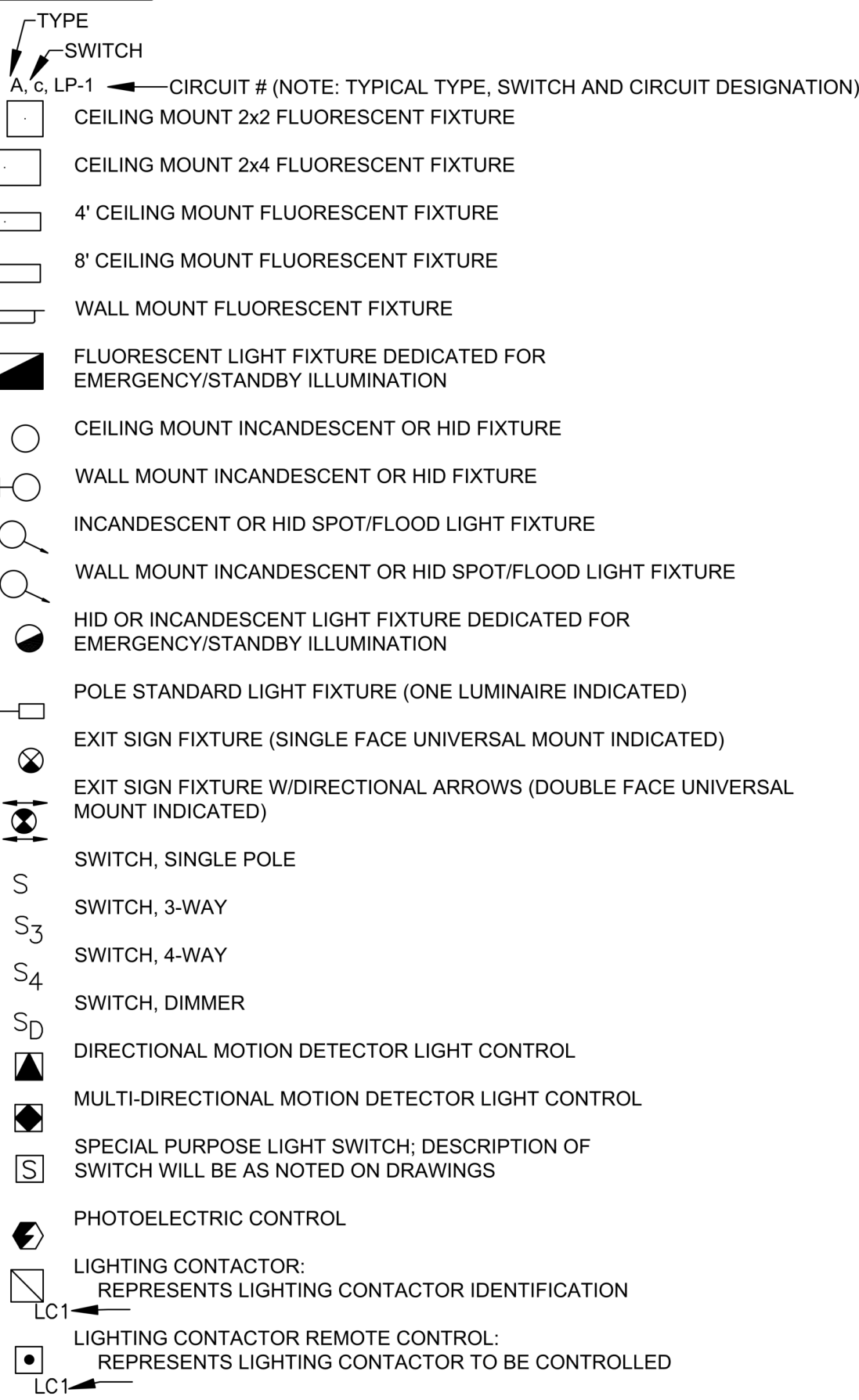


DE CORDOVA BEND DAM
LOW FLOW OUTLET WORKS REPAIR PROJECT
EXISTING GATES 1, 2, 3 AND 4

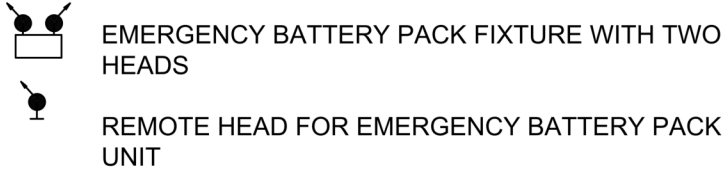
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Project Number: 21-05-1219
5/3/2021 6:14:29 AM
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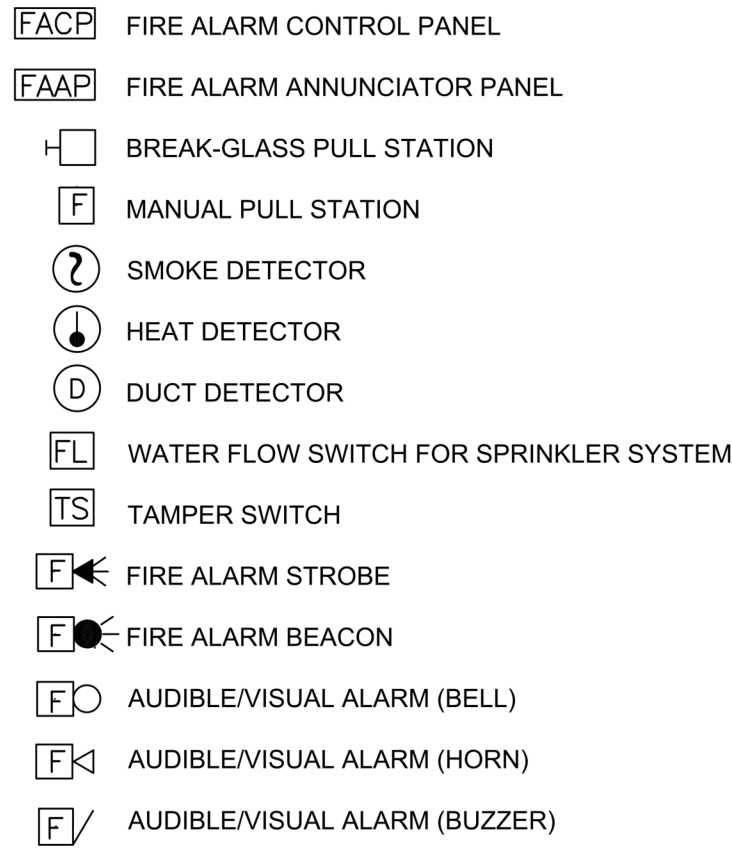
LIGHTING:



EMERGENCY LIGHTING:

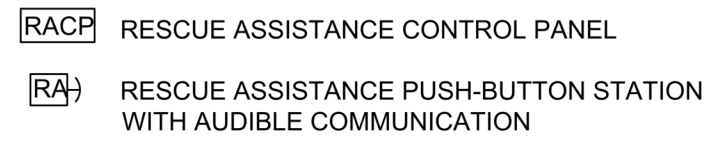


FIRE ALARM SYSTEM:



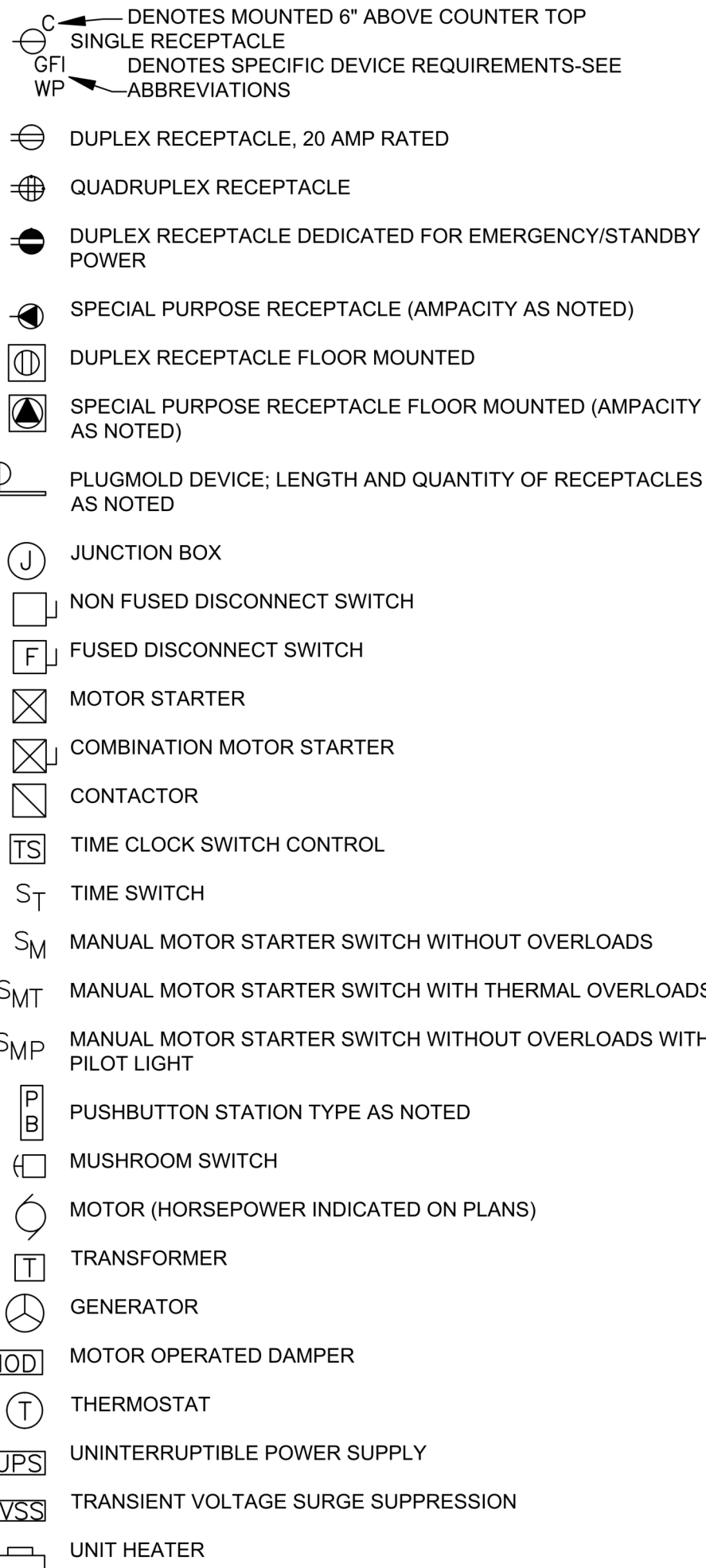
(SEE RISER DIAGRAM OR SPECIFICATIONS TO SPECIFY FLUSH OR SURFACE MOUNTED EQUIPMENT)

RESCUE ASSISTANCE SYSTEM:

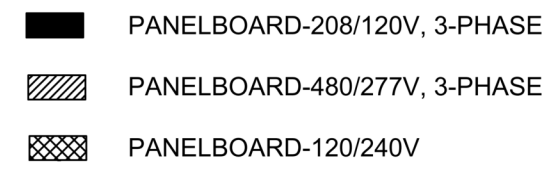


THIS DRAWING IS A GANNETT FLEMING STANDARD DRAWING. SYMBOLS, LEGENDS, AND ABBREVIATIONS ON THIS DRAWING MAY OR MAY NOT REFLECT EVERY CONDITION OF THIS PROJECT.

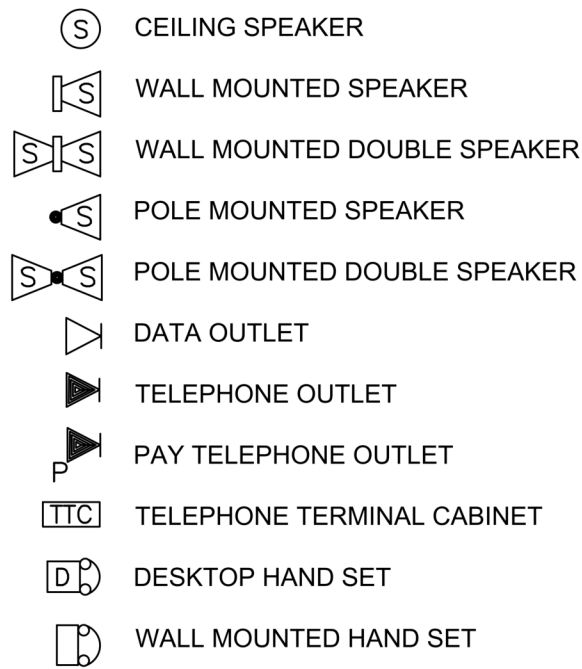
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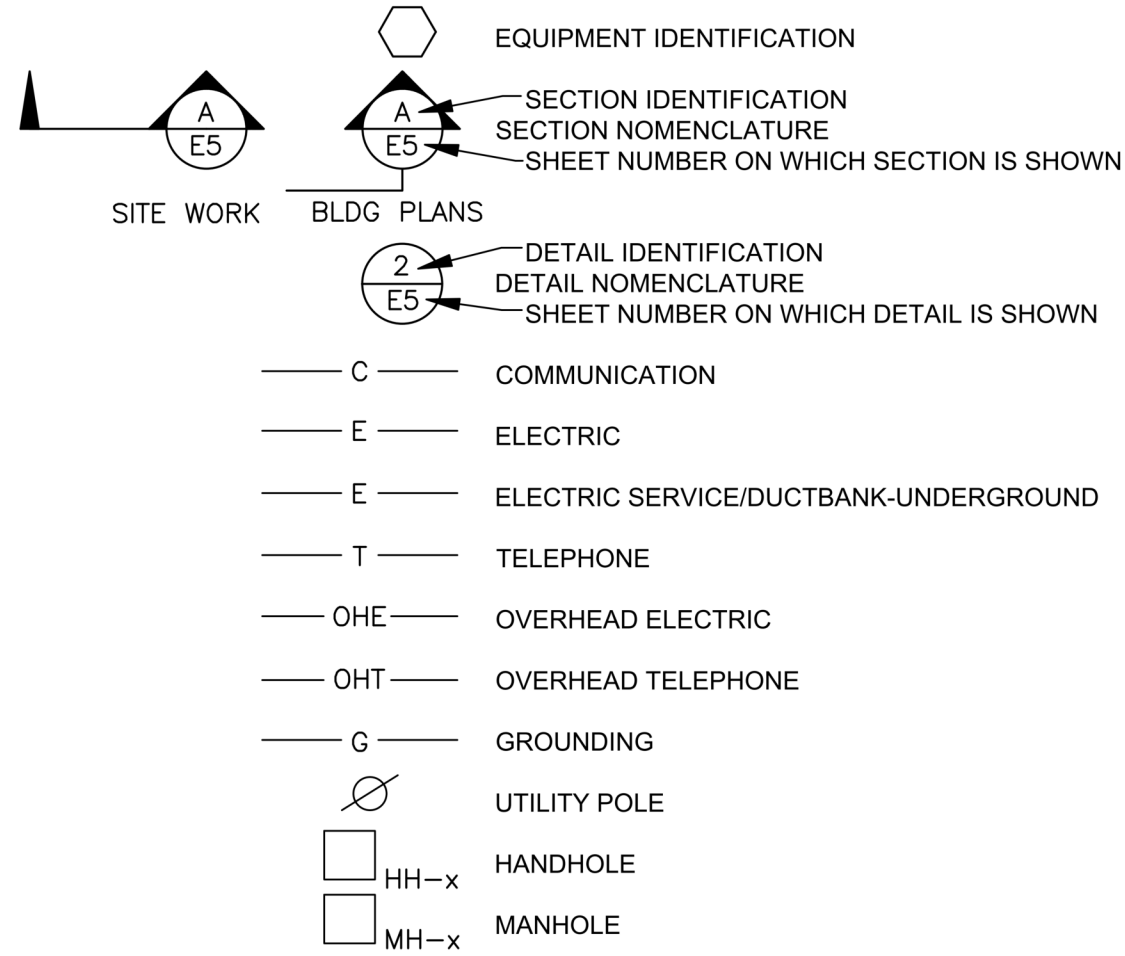
PANELBOARDS:



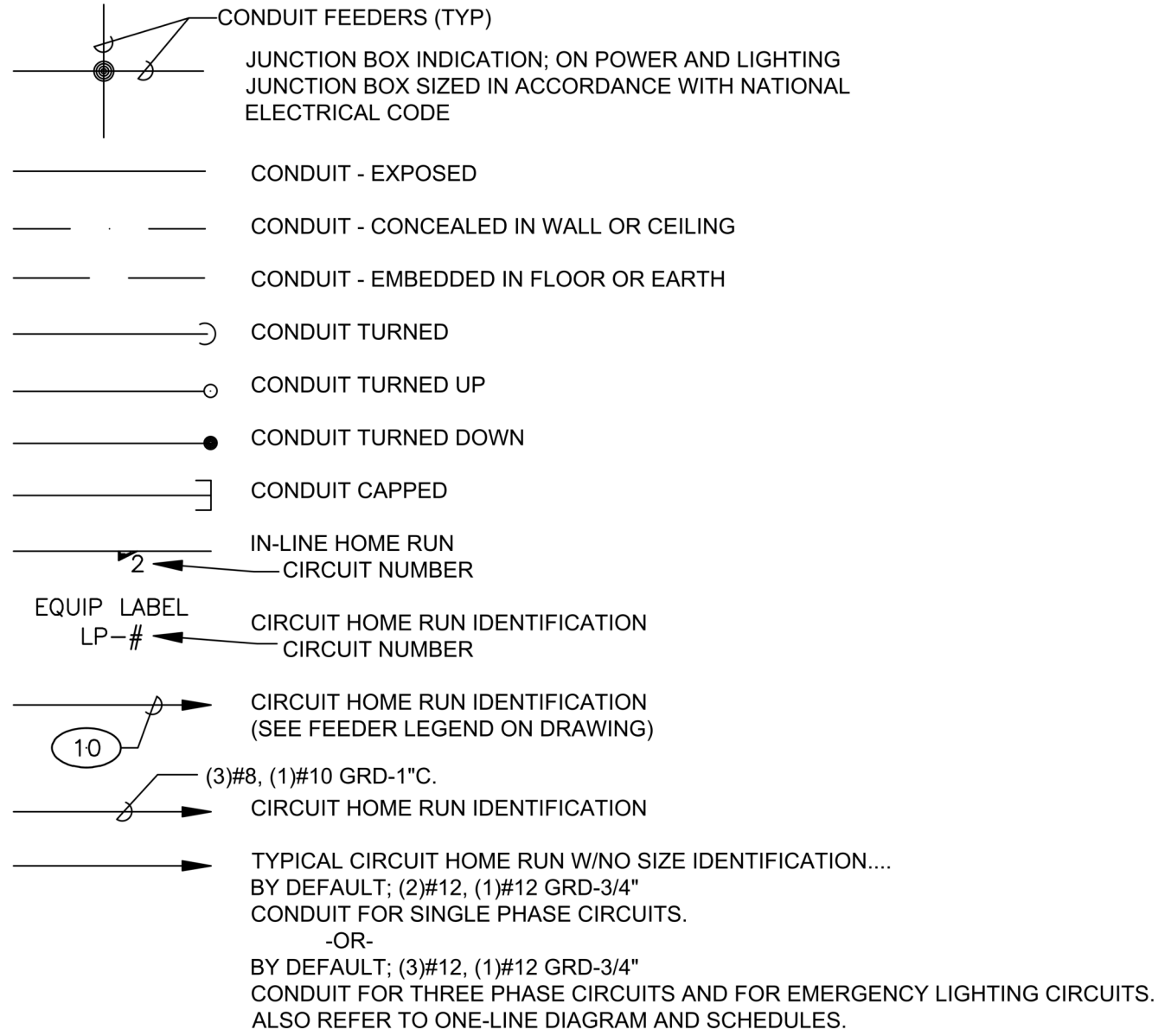
COMMUNICATIONS:



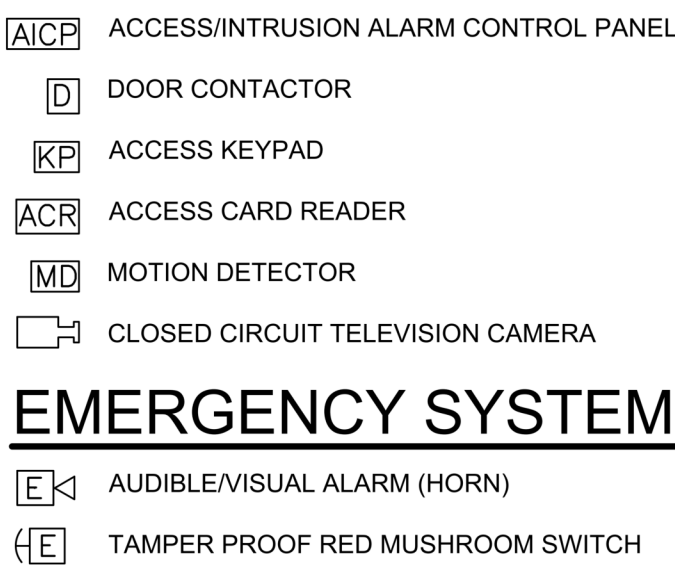
MISCELLANEOUS:



CONDUIT FEEDERS & BRANCH CIRCUITS:



ACCESS CONTROL/INTRUSION ALARM:



LEVEL	1	2	3	4	5
1	0	1"	3"	12"	12"
2	1"	0	3"	9"	12"
3	3"	3"	0	3"	6"
4	12"	9"	6"	0	3"

- ALL WIRE SHALL BE COPPER. MINIMUM CONDUIT SIZE SHALL BE 3/4".
- ALL CIRCUIT PROTECTIVE DEVICES SHALL HAVE THE REQUIRED RATING INTERRUPTING CAPACITY EQUAL TO OR GREATER THAN THE AVAILABLE SHORT-CIRCUIT CURRENT AT ITS SUPPLY TERMINAL. MINIMUM INTERRUPTING CAPACITY SHALL BE 10,000 AMPS, SYMMETRICAL A.I.C. FOR 120/240V SYSTEMS AND 14,000 AMPS SYMMETRICAL A.I.C. FOR 277/480V SYSTEMS.
- UPON COMPLETION OF THE JOB, THE ELECTRICAL CONTRACTOR SHALL PROVIDE THE OWNER AND ENGINEER WITH A FULL SIZE SET OF AS BUILT DRAWINGS. THE DRAWINGS SHALL CONTAIN ALL TERMINAL BLOCK NUMBERS AND WIRE NUMBERS.
- "BRA" = BRAZOS RIVER AUTHORITY; OWNER IS SYNONYMOUS WITH "BRA"

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ABBREVIATIONS:

A or AMP	AMPERE	LC	LIGHTING CONTACTOR
AC	ALTERNATING CURRENT	LFMC	LIQUIDTIGHT FLEXIBLE METAL CONDUIT
AFF	ABOVE FINISHED FLOOR	LTG	LIGHTING
AFG	ABOVE FINISHED GRADE	MCC	MOTOR CONTROL CENTER
AIC	AMPERE INTERRUPTING CAPACITY	MCP	MAIN CIRCULATION PUMP
AS	AMMETER SELECTOR SWITCH	MH	METAL HALIDE
ATS	AUTO TRANSFER SWITCH	MLO	MAIN LUG ONLY
AUTO	AUTOMATIC	MM	MILIMETER
AWG	AMERICAN WIRE GAUGE	MOA	MULTI-OUTLET ASSEMBLY
BCE	BASE CIVIL ENGINEER	MOD	MOTOR OPERATED DAMPER
BLDG	BUILDING	MS	MOTOR STARTER
C	CONDUIT	MTD	MOUNTED
CP	CONTROL PANEL	MTS	MANUAL TRANSFER SWITCH
CPT	CONTROL POWER TRANSFORMER	MV	MEDIUM VOLTAGE
DB	DEVICE BOX, SINGLE GANG, UON	N/A	NOT APPLICABLE
DCW	DOMESTIC COLD WATER	NC	NORMALLY CLOSED
DISC	DISCONNECT	NO	NORMALLY OPEN
DIV	DIVISION	No	NUMBER
DS	DISCONNECT SWITCH	PMT	PAD MOUNTED TRANSFORMER
DVC	DIGITAL VIDEO CONTROLLER	PNL	PANEL
EA	EACH	PS	POWER SUPPLY OR PULSE START
EC	ELECTRICAL CONTRACTOR	PS MH	PULSE START METAL HALIDE
EF	EXHAUST FAN	PT	POTENTIAL TRANSFORMER
EMT	ELECTRICAL METALLIC TUBING (CONDUIT)	PVC	POLYVINYL CHLORIDE (CONDUIT)
EMER	EMERGENCY	RECP	RECEPTACLES
EP	EXPLOSION PROOF EQUIPMENT	RGS	RIGID GALVANIZED STEEL (CONDUIT)
EQUIP	EQUIPMENT	RVAT	REDUCED VOLTAGE AUTOTRANSFORMER
ETBR	EXISTING TO BE REMOVED	RVSS	REDUCED VOLTAGE SOLID STATE
ETR	EXISTING TO REMAIN	SA	SURGE ARRESTOR
EUH	ELECTRIC UNIT HEATER	SC	SURGE CAPACITOR
FAAP	FIRE ALARM ANNUNCIATOR PANEL	SW	SWITCH
FACP	FIRE ALARM CONTROL PANEL	SWBD	SWITCHBOARD
F/T	FEED THROUGH	TB	TERMINAL BLOCKS
FU	FUSE	TC	CABLE TRAY-CABLE
FRE	FIBERGLASS REINFORCED EPOXY	TTB	TELEPHONE TERMINAL BOARD
GFI	GROUND FAULT INTERRUPTER	TTC	TELEPHONE TERMINAL CABINET
HID	HIGH INTENSITY DISCHARGE	TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSION
HP	HORSEPOWER	TYP	TYPICAL
HPS	HIGH PRESSURE SODIUM	UL	UNDERWRITER LABORATORIES
HVAC	HEAT-VENT-AIR CONDITIONING	UH	UNIT HEATER
IG	ISOLATED GROUND	UON	UNLESS OTHERWISE NOTED
IFS	INTEGRATED FACILITY SYSTEM	UPS	UNINTERRUPTIBLE POWER SUPPLY
IND	INDUSTRIAL	V	VOLT
JB	JUNCTION BOX	VS	VOLTMETER SELECTOR SWITCH
JIC	JOINT INDUSTRIAL COUNCIL	W	WATT OR WIRE OR WITH
KV	KILOVOLT	WP	WEATHERPROOF
KVA	KILOVOLT AMPERE	XFMR	TRANSFORMER
KW	KILOWATT	1-PH	SINGLE PHASE
LA	LIGHTNING ARRESTOR	3-PH	THREE PHASE

WIRE SEPARATION NOTES:

- SIGNAL CIRCUITS AND ALARM CIRCUITS SHALL BE RUN IN CONDUITS SEPARATE FROM ALL OTHER WIRING.
- SERVICE ENTRANCE, GENERATOR AND ALL LARGE FEEDERS SHALL BE IN SEPARATE CONDUITS.
- SEPARATE WIRING INTO RACEWAY BY LEVELS AS FOLLOWS:
 - LEVEL 1 1)ANALOG SIGNALS LESS THAN 50 VOLTS AND LESS 50 MILLIAMPS.
 - 4-20ma SHIELDED INSTRUMENTATION.
 - SHIELDED LOW LEVEL INSTRUMENTATION.
 - VARIABLE SPEED DRIVE SPEED SIGNALS.
 - 2)DIGITAL SIGNAL AND DATA BUSSES
 - PROGRAMMABLE LOGIC CONTROLLER BUSES.
 - METERING SYSTEM DATA BUS.
 - INSTRUMENTATION REMOTE TERMINAL UNIT BUS.
 - LEVEL 2 1)ANALOG SIGNAL OVER 50 VOLTS AND LESS THAN 250 VOLTS
 - TACHOMETER GENERATORS.
 - 2)DIGITAL AND DISCRETE INPUTS TO PROGRAMMABLE LOGIC CONTROLLERS AND REMOTE TERMINAL UNITS ALL OUTPUTS SUPPLYING RELAY COILS SHALL HAVE PROPER SUPPRESSION.
 - LEVEL 3 1)POWER CIRCUITS OF 20 AMPERES OR LESS AND 120 VOLTS OR LESS
 - LIGHTING AND RECEPTACLE CIRCUITS TO BE IN SEPARATE CONDUITS, UNLESS OTHERWISE NOTED.
 2. CLASS 1 CONTROL CIRCUITS ORIGINATING IN A MCC COMPARTMENT OR A MOTOR STARTER CAN BE ROUTED IN THE POWER CONDUIT FROM SAME COMPARTMENT.
 - LEVEL 4 1)POWER CIRCUITS OVER 20 AMPERES UP TO 400 AMPERES, 600 VOLTS. EACH CIRCUIT SHALL BE RUN IN SEPARATE CONDUITS.
 - LEVEL 5 1)FEEDERS OVER 400 AMPERES.
- EACH LEVEL MUST BE RUN IN SEPARATE RACEWAYS.
- UNLESS OTHERWISE NOTED SEPARATE ALL PARALLEL RACEWAY RUN 5'-0" OR LONGER WITH DIFFERENT LEVELS AS FOLLOWS:

THE CONTRACTOR SHALL COMPLY WITH THE NEC-2017

REV	DESCRIPTION	BY	DATE

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DESIGNED BY:	SSV
REVIEWED BY:	DLR
APPROVED BY:	
DATE:	4/30/2021



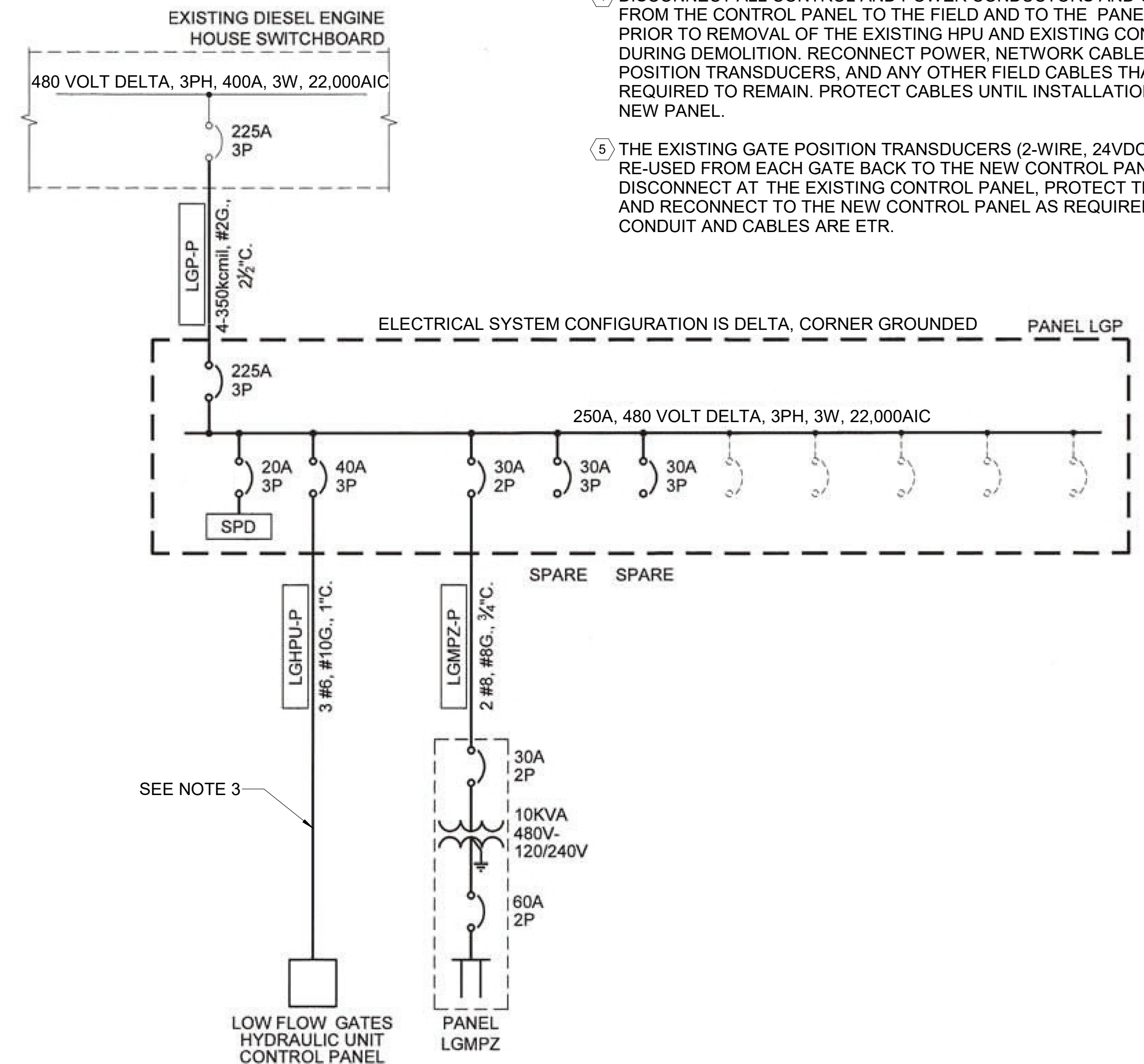
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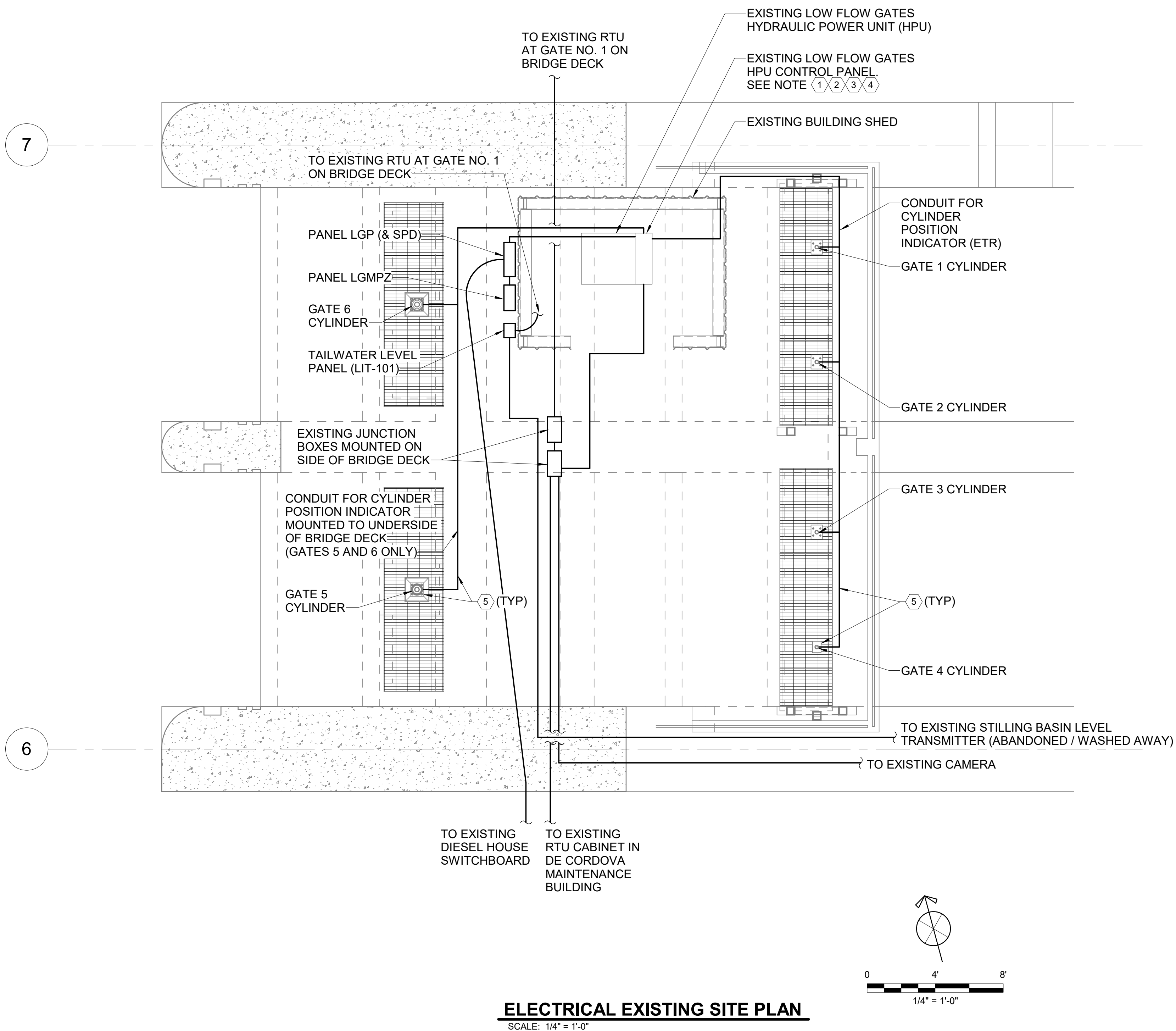
DE CORDOVA BEND DAM
LOW FLOW OUTLET WORKS REPAIR PROJECT
ELECTRICAL SYMBOLS, LEGENDS & ABBREVIATIONS

BRA FILE NO.:	DRAWING NO. E001
DWG LABEL: _S_central_R19.rvt	SHEET NO. 10

- ① THE EXISTING CONTROL PANEL IS BEING REPLACED NEW, AND IN THE SAME LOCATION. PROVIDE NEW CONDUITS, NEW CABLING, AND ALL NEW POWER AND CONTROL WIRING FROM THE NEW HPU TO THE NEW CONTROL PANEL, AS REQUIRED FOR SUCCESSFUL OPERATION.
- ② GATE CYLINDER OPEN AND CLOSED PRESSURE SWITCHES ARE NEW; PROVIDE NEW CONTROL WIRING FOR EACH GATE CYLINDER AS REQUIRED FOR EACH NEW OPEN AND EACH NEW CLOSE PRESSURE SWITCH FROM THE HPU TO THE CONTROL PANEL. PROVIDE CONTROL WIRING THAT IS COMPATIBLE WITH THE PRESSURE SWITCHES PROVIDED BY THE CONTRACTOR.
- ③ RECONNECT, AND REUSE THE EXISTING FEEDER CONDUCTORS, CONDUIT AND BREAKER TO THE NEW CONTROL PANEL. CONTRACTOR SHALL ADJUST IN THE FIELD BASED UPON THE ACTUAL LOAD OF THE NEW CONTROL PANEL AND NEW HPU UNIT, PER THE LATEST APPROVED EDITION OF THE NEC IN TEXAS AND PER THE LOCAL AHJ. IF NECESSARY UPSIZE BREAKER AND CONDUCTORS, AND CONDUIT SIZE FOR ANY INCREASED LOAD. CONTRACTOR SHALL INCLUDE IN THE BID PRICE TO UPSIZE THE HPU CONTROL PANEL BREAKER TO THE NEXT STANDARD SIZE AND TO UPSIZE THE FEEDER CONDUCTORS TO THE NEXT STANDARD SIZE.
- ④ DISCONNECT ALL CONTROL AND POWER CONDUCTORS AND CONDUIT FROM THE CONTROL PANEL TO THE FIELD AND TO THE PANELBOARD, PRIOR TO REMOVAL OF THE EXISTING HPU AND EXISTING CONTROL PANEL, DURING DEMOLITION. RECONNECT POWER, NETWORK CABLE, AND POSITION TRANSDUCERS, AND ANY OTHER FIELD CABLES THAT ARE REQUIRED TO REMAIN. PROTECT CABLES UNTIL INSTALLATION INTO THE NEW PANEL.
- ⑤ THE EXISTING GATE POSITION TRANSDUCERS (2-WIRE, 24VDC) SHALL BE RE-USED FROM EACH GATE BACK TO THE NEW CONTROL PANEL; DISCONNECT AT THE EXISTING CONTROL PANEL, PROTECT THE CABLES, AND RECONNECT TO THE NEW CONTROL PANEL AS REQUIRED (TYP.) CONDUIT AND CABLES ARE ETR.



1 **EXISTING ONE LINE DIAGRAM**
E002 SCALE: NTS




ELECTRICAL EXISTING SITE PLAN

SCALE: 1/4" = 1'-0"

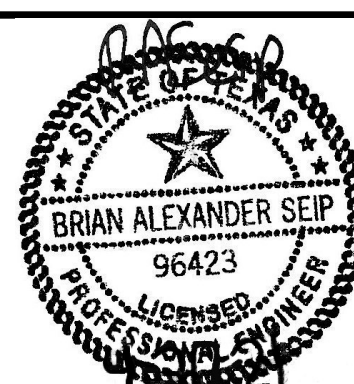
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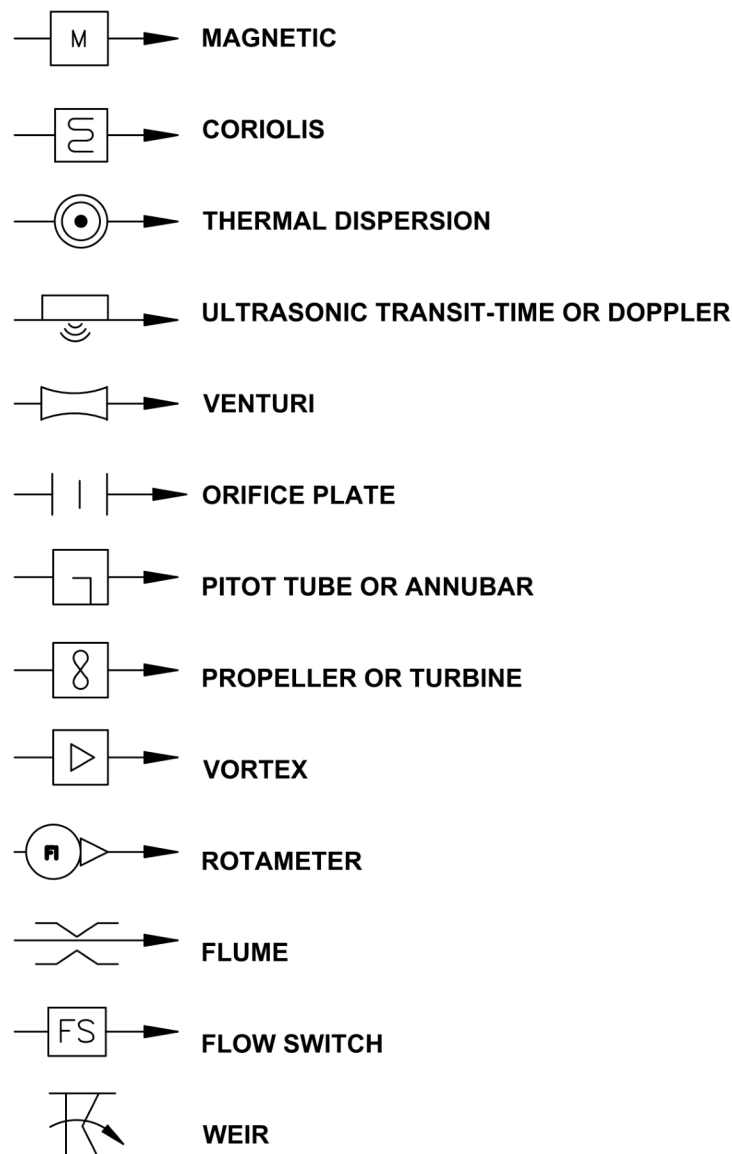


DE CORDOVA BEND DAM
LOW FLOW OUTLET WORKS REPAIR PROJECT
ELECTRICAL EXISTING SITE PLAN

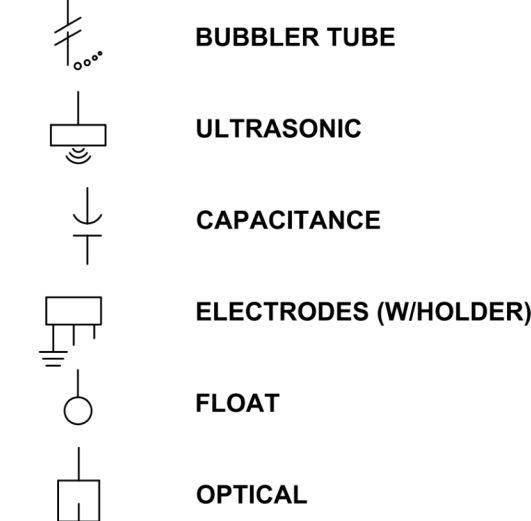
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DWG LABEL: S central R19.rvt	SHEET NO. 11

PRIMARY ELEMENT:

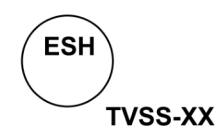
FLOW



LEVEL

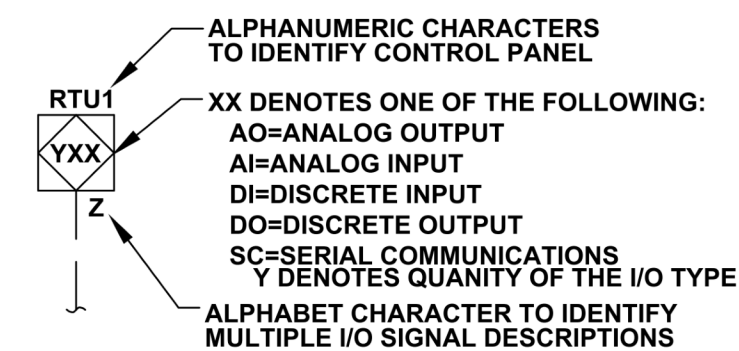


TRANSIENT VOLTAGE SURGE SUPPRESSOR:

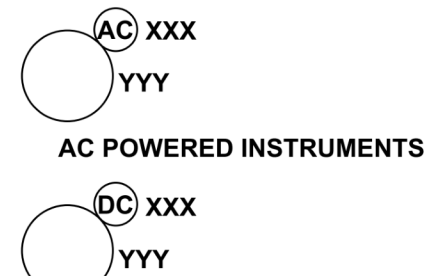


XX DENOTES SPECIFIC TYPE IDENTIFIER

INPUT/OUTPUT DESIGNATION:

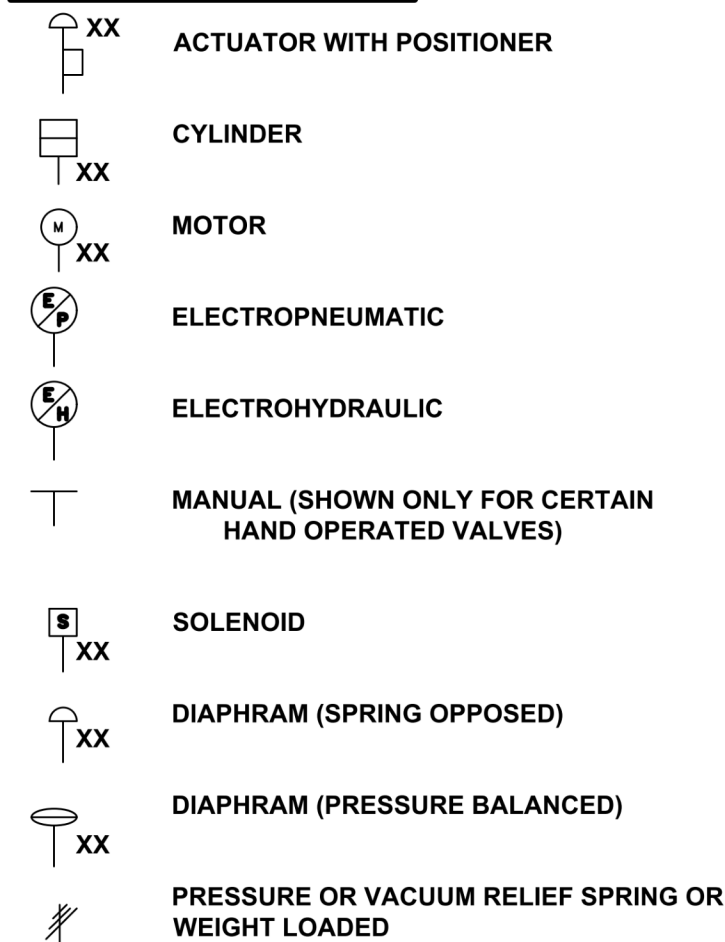


EQUIPMENT POWER:



XXX DENOTES POWER VOLTAGE, 120V UNLESS OTHERWISE NOTED
YYY ALPHANUMERIC CHARACTERS TO IDENTIFY THE SOURCE OF POWER, PP (POWER PANEL) UNLESS OTHERWISE NOTED

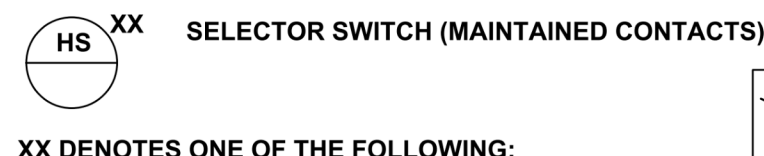
ACTUATORS:



NOTE: ON LOSS OF PRIMARY POWER (PNEUMATIC OR ELECTRICAL)

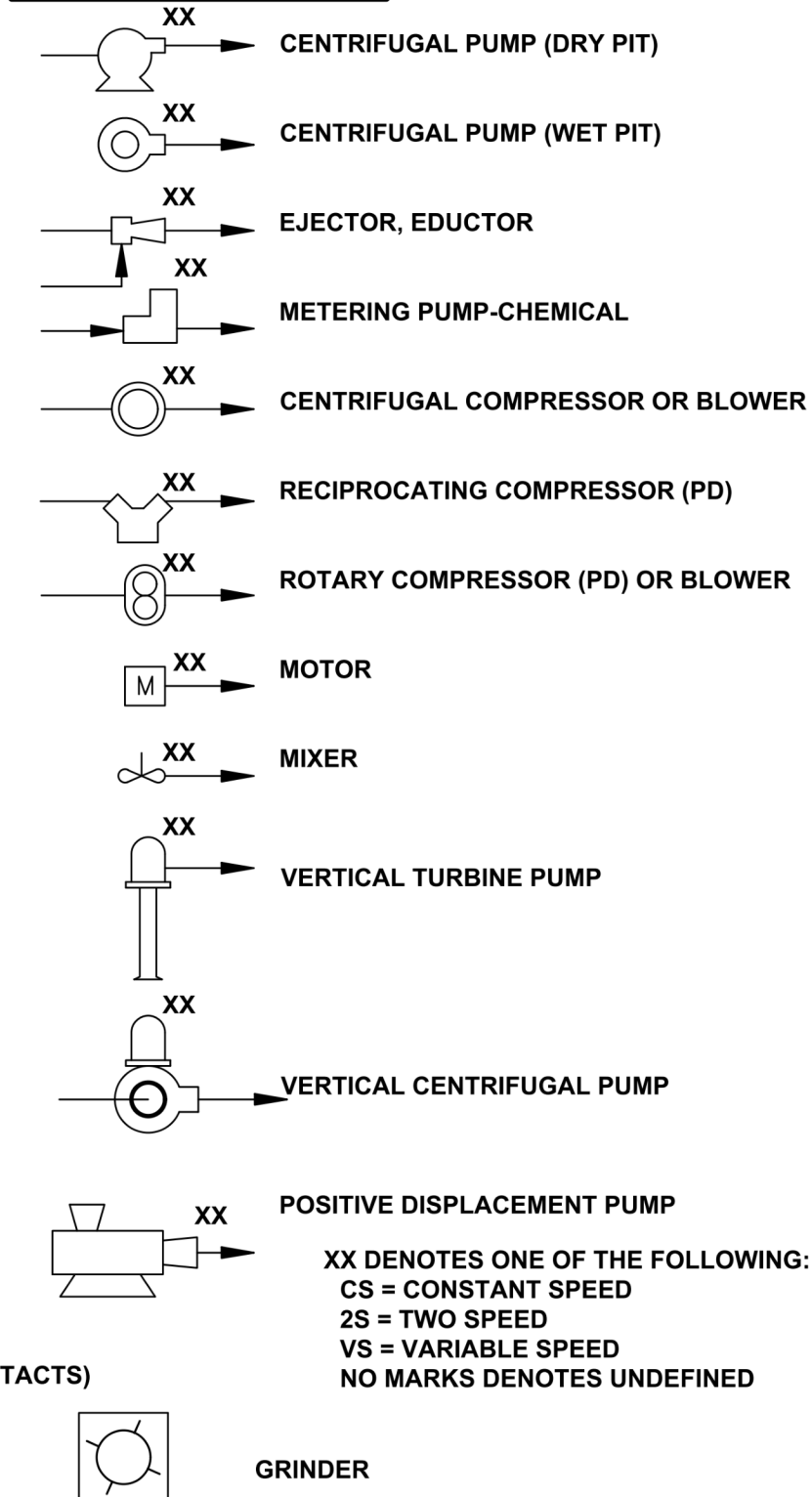
XX DENOTES ONE OF THE FOLLOWING:
FO = FAIL OPEN
FC = FAIL CLOSED
FI = FAIL TO INTERMEDIATE POSITION
BLANK = FAIL TO LAST POSITION

HAND SWITCHES



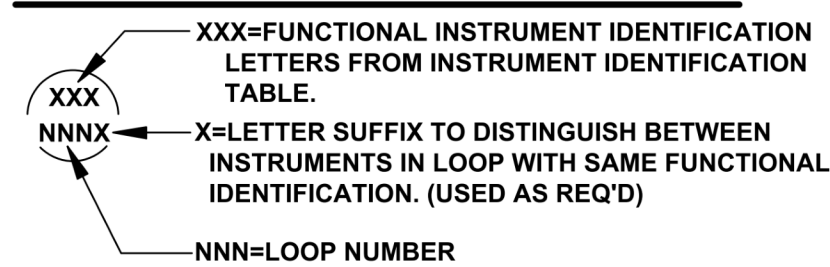
XX DENOTES ONE OF THE FOLLOWING:
AM=AUTO/MANUAL
CAM=COMPUTER/AUTO/MANUAL
CL=COMPUTER/LOCAL
CM=COMPUTER/MANUAL
DOB=DRIVE/OFF/BYPASS
FOS=FAST/OFF/SLOW
FOR=FORWARD/OFF/REVERSE
FR=FORWARD/REVERSE
FS=FAST/SLOW
HOA=HAND/OFF/AUTO
KEY=KEYPAD
LOR=LOCAL/OFF/REMOTE
LOS=LOCKOUT/STOP
MFS=MODULATE FASTER/SLOWER
MOC=MODULATE OPEN/CLOSE
OC=OPEN/CLOSE
OO=ON/OFF
OSC=OPEN/STOP/CLOSE
SS=START/STOP
PB=PUSH BUTTON

EQUIPMENT:

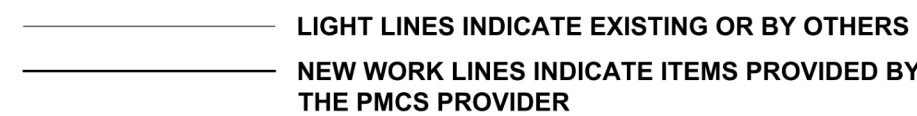


XX DENOTES ONE OF THE FOLLOWING:
CS = CONSTANT SPEED
2S = TWO SPEED
VS = VARIABLE SPEED
NO MARKS DENOTES UNDEFINED

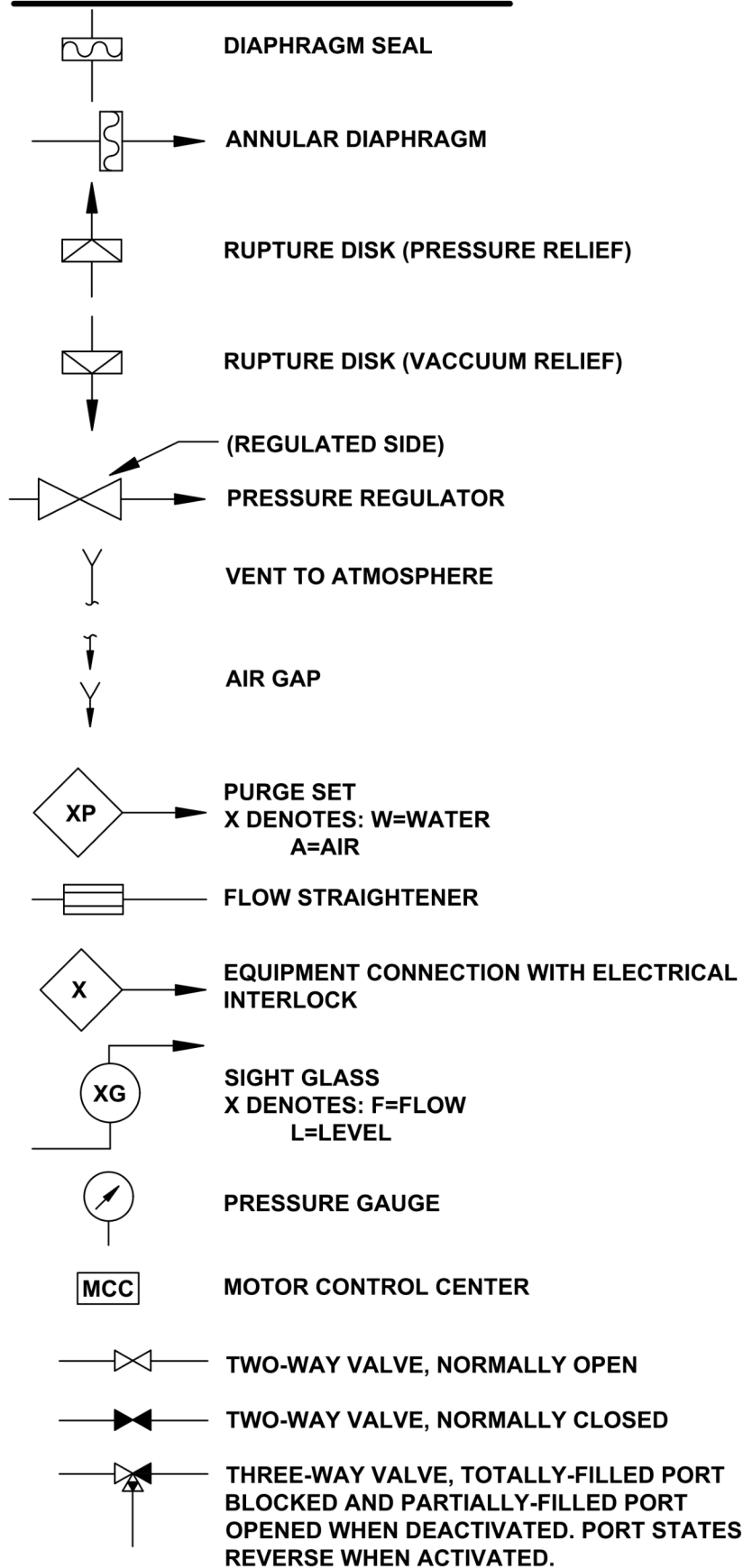
INSTRUMENT TAGGING:



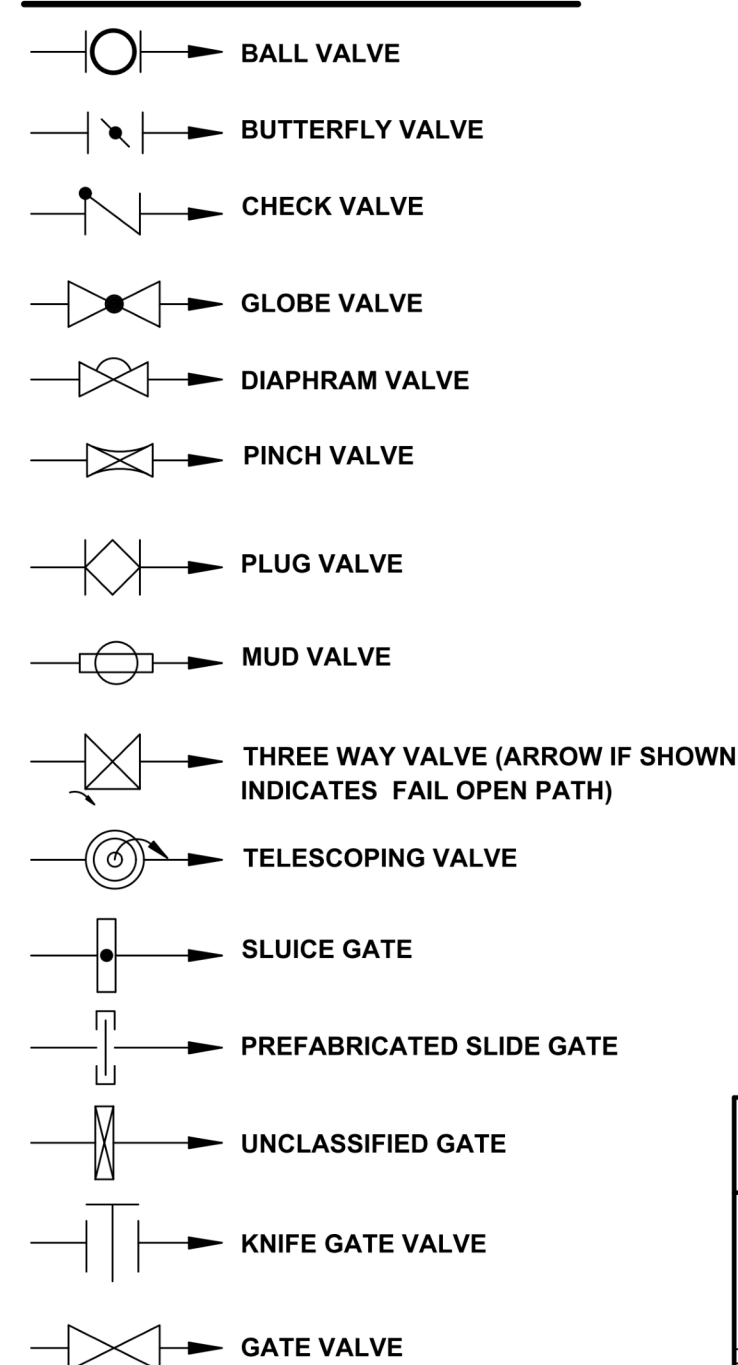
LINE WEIGHTS



MISCELLANEOUS:



VALVES & GATES:



NOTES:

- ONLY EXTERNAL INTERFACE SIGNALS ARE SHOWN FOR MOTOR CONTROLLERS/STARTERS (MCC) AND VARIABLE SPEED DRIVES (VFD).
- PROVIDE DEVICES SHOWN ON THE DRAWING AND AS SPECIFIED.
- ALL INTERCONNECTING WIRING AND TERMINATORS BETWEEN EQUIPMENT, BY ELECTRICAL CONTRACTOR UNLESS OTHERWISE NOTED.
- PROCESS MONITORING AND CONTROL SYSTEM CONTRACTOR SHALL PROVIDE THE ELECTRICAL CONTRACTOR WITH A FULL SIZE SET OF THEIR WIRING DIAGRAMS WITH TERMINAL BLOCK NUMBERS FILLED IN.
- UPON COMPLETION OF THE JOB, THE ELECTRICAL CONTRACTOR SHALL PROVIDE THE OWNER AND ENGINEER WITH A FULL SIZE SET OF AS BUILT DRAWINGS. THE DRAWINGS SHALL CONTAIN ALL TERMINAL BLOCK NUMBERS AND WIRE NUMBERS.
- REFER TO WIRE SEPARATION NOTES ON THE ELECTRICAL DRAWING GENERAL NOTES SHEET FOR COMBINING WIRING.
- UNLESS OTHERWISE NOTED, ALL DIGITAL INPUT/OUTPUT WIRING SHALL BE #14 AWG, AND ANALOG INPUT/OUTPUT WIRING SHALL BE #16 AWG TWISTED, SHIELDED CABLE.

EQUIPMENT TAGGING:

X DENOTES ONE OF THE FOLLOWING:
M=MIXER, B=BLOWER, G=GRINDER,
P=PUMP, D=DRIVE UNIT, T=TANK,
V=VALVE, C=CONVEYOR,
CS=COMPOSITE SAMPLER
NNN IS EQUAL TO LOOP NUMBER

INSTRUMENT/FUNCTION & LOCATION SYMBOLS

	FIELD (LOCAL) MOUNTED	PANEL MOUNTED		MOTOR CONTROL CENTER MOUNTED	
		ACCESSIBLE OR EXTERIOR	INACCESSIBLE OR INTERIOR	ACCESSIBLE OR EXTERIOR	INACCESSIBLE OR INTERIOR
DISCRETE INSTRUMENT					
SHARED DISPLAY/CONTROL					
COMPUTER FUNCTION					
PROGRAMMABLE LOGIC CONTROL					
PILOT LIGHT					
COMPOUND INSTRUMENTS (SHARE COMMON HOUSING)					

INSTRUMENT IDENTIFICATION TABLE

ISA-S5.1-1984

	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
C	CONDUCTIVITY			CONTROL	
D	DENSITY (MASS) OR SPECIFIC GRAVITY	DIFFERENTIAL			
E	VOLTAGE		SENSOR (PRIMARY ELEMENT)		
F	FLOW RATE	RATIO (FRACTION)			
G	GAGING (DIMENSIONAL)		GLASS, VIEWING DEVICE		HIGH (OPENED)
H	HAND (MANUALLY INITIATED)				
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHEDULE				
L	LEVEL		LIGHT (PILOT)	CONTROL STATION	
M	MOISTURE OR HUMIDITY				LOW (CLOSED)
N	ON/OFF				MIDDLE OR INTERMEDIATE
O	USER'S CHOICE		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
P	PRESSURE, VACUUM		ORIFICE, RESTRICTION POINT (TEST) CONNECTION		
Q	QUANTITY OR EVENT	INTEGRATE, TOTALIZE			
R	RADIOACTIVITY		RECORD		
S	SPEED, FREQUENCY	SAFETY			
T	TEMPERATURE			SWITCH	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION			VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL		
X	UNCLASSIFIED,		UNCLASSIFIED		UNCLASSIFIED
Y	USER'S CHOICE			RELAY, COMPUTE, CONVERT	
Z	POSITION			DRIVER, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT	

THIS DRAWING IS A GANNETT FLEMING STANDARD DRAWING. SYMBOLS, LEGENDS, AND ABBREVIATIONS ON THIS DRAWING MAY OR MAY NOT REFLECT EVERY CONDITION OF THIS PROJECT.

THE CONTRACTOR SHALL COMPLY WITH THE NEC-2017

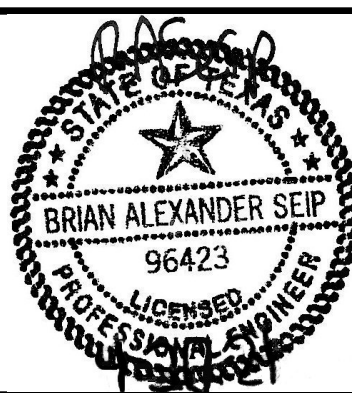
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REV	DESCRIPTION	BY	DATE

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DESIGNED BY:	SSV
REVIEWED BY:	DLR
APPROVED BY:	
DATE:	4/30/2021



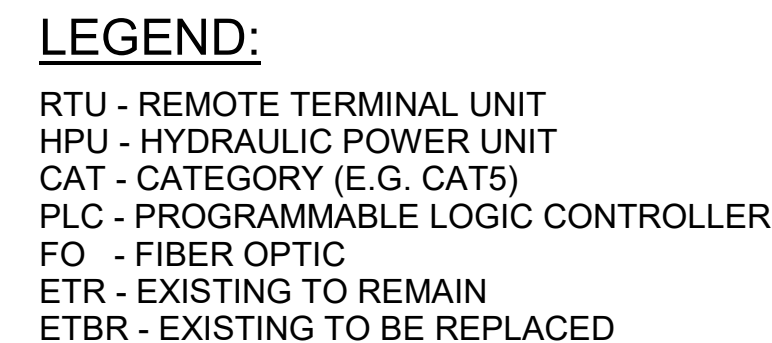
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DE CORDOVA BEND DAM
LOW FLOW OUTLET WORKS REPAIR PROJECT
INSTRUMENTATION SYMBOLS, LEGENDS & ABBREVIATIONS

BRA FILE NO.:	DRAWING NO. 1001
DWG LABEL: _S_central_R19.rvt	SHEET NO. 12

1. THE DIAGRAM AND SCHEMATIC BELOW ARE FOR THE TEMPERATURE AND HUMIDITY DATA LOGGER WITHIN THE NORTH AND SOUTH LOW FLOW INTERMEDIATE WELLS ADJACENT TO THE GATE INLETS WHICH WILL MONITOR AND LOG AIR TEMPERATURE AND HUMIDITY THROUGHOUT COATING WORK (FROM SURFACE PREPARATION THROUGH FINAL CURING).
2. SEE ALSO SPECIFICATION SECTION 01 32 36.10 - VIDEO, TEMPERATURE & HUMIDITY MONITORING AND DOCUMENTATION.



1. OTHER INSTRUMENTATION SYSTEMS EXIST AND ARE NOT SHOWN FOR CONVENIENCE.
2. THE CONTRACTOR IS RESPONSIBLE FOR COMPLETING ALL LOW FLOW WORK TO INTEGRATE WITH THE EXISTING SYSTEM ARCHITECTURE. WORK SHALL NOT INTERFERE WITH THE OPERATION OF THE REMAINDER OF THE SYSTEM (E.G. RADIAL GATES 1 - 16, SECURITY SYSTEMS, POWER, ETC.) WITHOUT WRITTEN APPROVAL FROM THE ENGINEER.


- ① THIS PANEL SHALL BE REPLACED NEW, IN-KIND, AS PART OF THE HPU REPLACEMENT; RECONNECT TO THE EXISTING SCADA NETWORK WITH THE EXISTING DATA COMMUNICATIONS TO AND FROM THE SCADA HMI IN THE MAINTENANCE BUILDING. REASSIGN THE SAME STATIC IP ADDRESS FROM THE REPLACED PLC CONTROL PANEL. CONTRACTOR SHALL PROVIDE THE NECESSARY SOFTWARE DRIVERS TO EXCHANGE DATA WITH THE EXISTING HMI EXISTING HMI (IN THE MAINTENANCE BUILDING) IS WONDERWARE INTOUCH 2014.
- ② ALL HMI PROGRAMMING SHALL BE SELF-PERFORMED BY THE OWNER, CONTRACTOR SHALL COORDINATE WITH THE OWNER AS REQUIRED.

Local File: BIM 360://066396 - De Cordova Low Flow/66396_Central_R20_BIM360.rvt
S central R19.rvt

Project Number: 21-05-1219
5/3/2021 6:14:37 AM

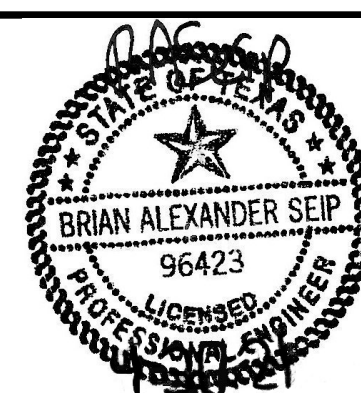
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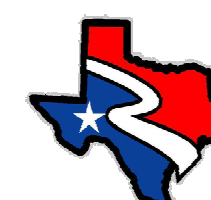


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DRAWN BY:	DJB
DESIGNED BY:	SSV
REVIEWED BY:	DLR
APPROVED BY:	
DATE:	4/30/2021



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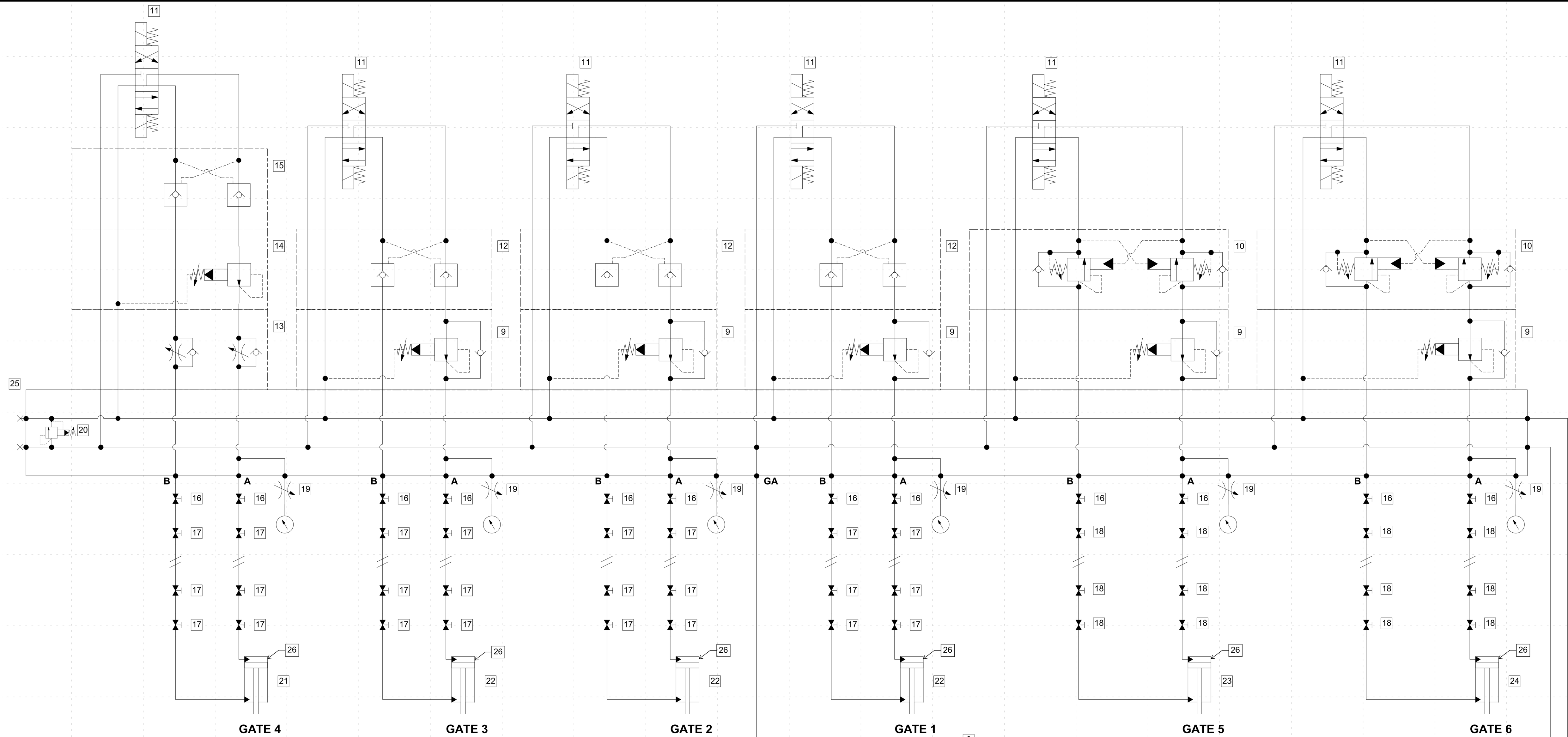
**BRAZOS
RIVER
AUTHORITY**

DE CORDOVA BEND DAM
LOW FLOW OUTLET WORKS REPAIR PROJECT
SYSTEM ARCHITECTURE

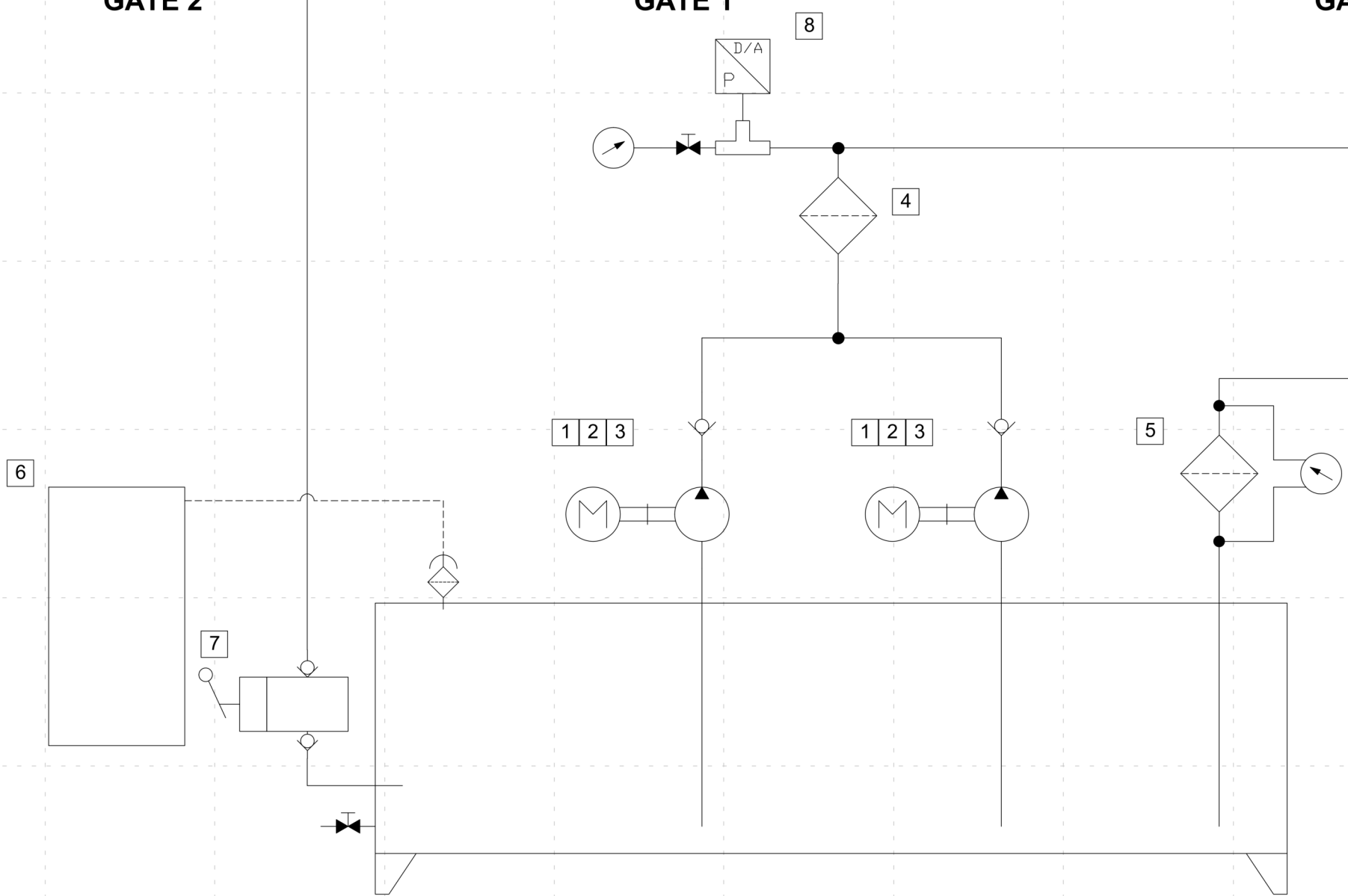
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Project Number: 21-05-1219
5/3/2021 6:14:39 AM
Local File: BIM_360/066396 - De Cordova Low Flow/66396_Central_R20_BIM360.rvt
S_central_R19.rvt



Reference	Quantity	Manufacturer	Part Number	Catalogue Description
1	2	CROWN TRITON	PKP184PR235	5HP, 1760 RPM, TEFC
2	N/A		N/A	GEAR PUMP, UNKNOWN DISPLACEMENT
3	2	PARKER	C620S	CHECK VALVE
4	1	PARKER	WPF105QEVMS2KS081	PRESSURE FILTER
5	1	PARKER	926169 10C	RETURN FILTER
6	1	PARKER	KVEU020PWWT50A1	KLEENVENT
7	1	HYDRAFORCE	HP10-21A-B	HAND PUMP
8	1	GEMS	3200B30CPS1JFR02	PRESSURE TRANSDUCER
9	5	SUN HYDRAULICS	PBDB-LAN-EB2	PRESSURE REDUCING VALVE ASSEMBLY
10	2	SUN HYDRAULICS	CBCBLHN-EBY	1.5:1 PILOT RATIO, COUNTERBALANCE VALVE ASSEMBLY
11	6	PARKER	D1VW004CNYW	DIRECTIONAL VALVE
12	3	SUN HYDRAULICS	CKCBXAN-EBY	PILOT-TO-OPEN CHECK VALVE ASSEMBLY
13	1	SUN HYDRAULICS	NCBBLCN-ABV	FULLY ADJ NEEDLE VALVE W/ REVERSE FLOW CHECK ASSEMBLY
14	1	SUN HYDRAULICS	PBBBLAN-JBV	PILOT OPERATED PRESSURE REDUCING VALVE ASSEMBLY
15	1	SUN HYDRAULICS	CKBBXCN-JBW	PILOT-TO-OPEN CHECK VALVE ASSEMBLY
16	12	DMIC	BVH0500S	BALL VALVE
17	24	SWAGELOK	SS-AFSS6	BALL VALVE
18	12	SWAGELOK	SS-AFSS8	BALL VALVE
19	6	SUN HYDRAULICS	NSABKXVAA	ADJUSTABLE SNUBBER
20	1	SUN HYDRAULICS	RPEC-JAN	RELIEF VALVE, PILOT OPERATED
21	1	PARKER	2.50JJ2HXKTS33A30.000	CYLINDER, 2.5" X 1.375" X 33"
22	3	PARKER	5.00JJ2HXKTS23A62.000	CYLINDER, 5.0" X 2.0" X 62"
23	1	PARKER	7.00JJ3HXKTS13A11??	CYLINDER, 7.0" X 3.0" X 116"
24	1	PARKER	8.00JJ3HXKTS13A116.000	CYLINDER, 8.0" X 3.5" X 116"
25	1	DAMAN	*MODIFIED* AD03P064S/S	BAR MANIFOLD
26	6	SWAGELOK	SS-ORF2	INTEGRAL BONNET NEEDLE VALVE



EXISTING HPU NOTES:

1. THE EXISTING HPU CONFIGURATION IS SHOWN FOR REFERENCE ONLY. THE REPLACEMENT HPU SHALL BE NEW, SATISFY MINIMUM PERFORMANCE, AND FEATURE REQUIREMENTS PER SPECIFICATION SECTION 41 24 26 - HYDRAULIC POWER UNIT AND SHALL BE DESIGNED AND FABRICATED BY A QUALIFIED HPU MANUFACTURER.
2. EXISTING HPU OVERALL APPROXIMATE DIMENSIONS: 50"L X 36"W X 76"H

REV	DESCRIPTION	BY	DATE

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REVIEWED BY: NA
APPROVED BY:
DATE: 4/30/2021

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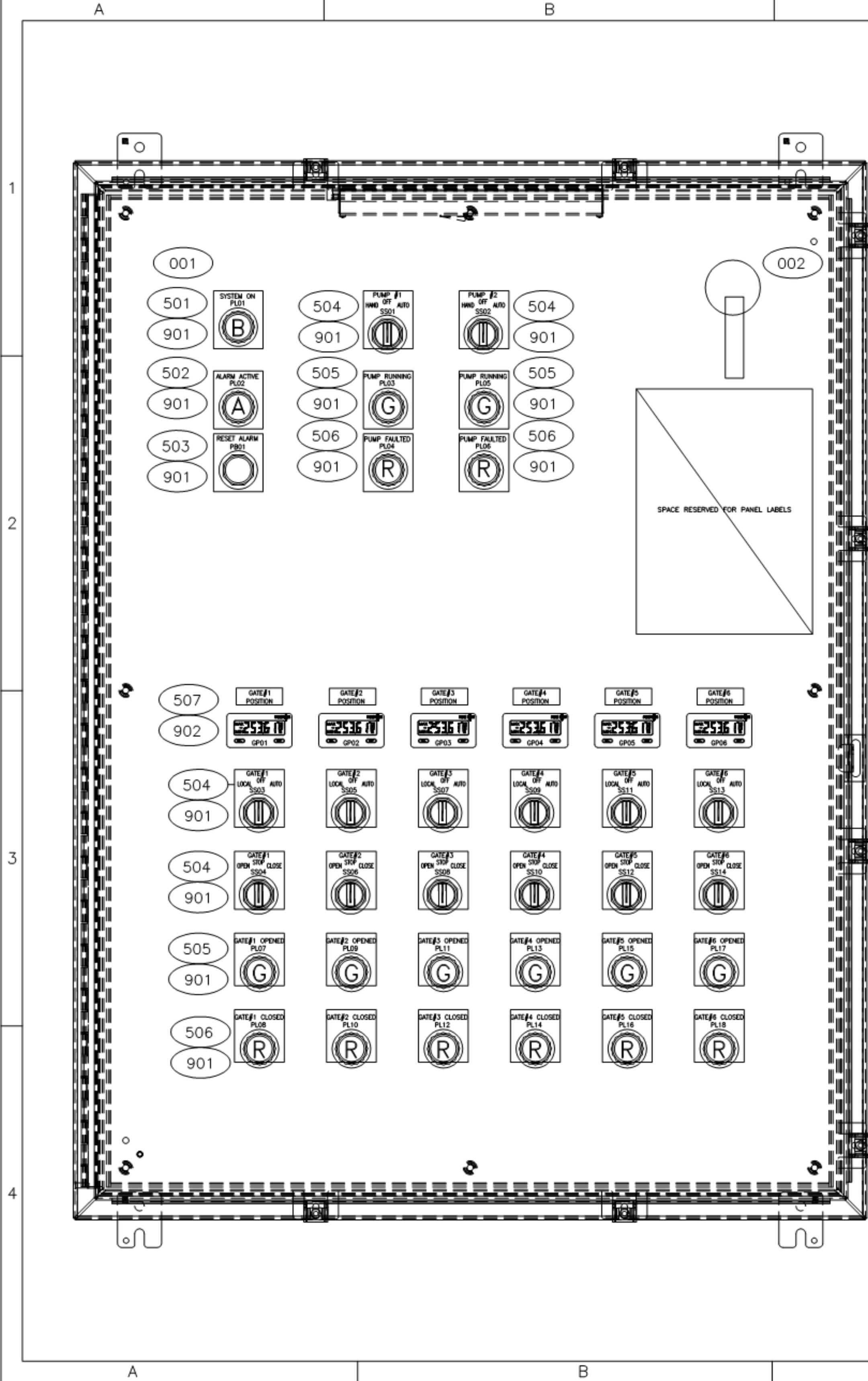
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DE CORDOVA BEND DAM
LOW FLOW OUTLET WORKS REPAIR PROJECT
EXISTING HPU DIAGRAM (FOR REFERENCE ONLY)

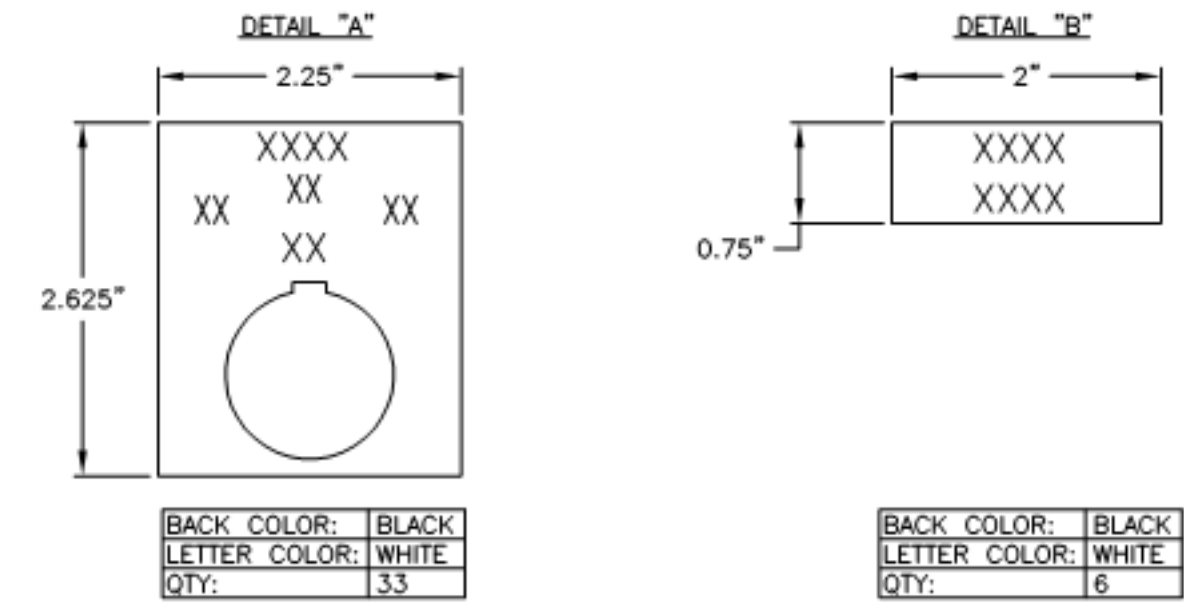
BRA FILE NO.:
DRAWING NO. R001

DWG LABEL: S_central_R19.rvt
SHEET NO. 14



BILL OF MATERIAL			
ITEM	DESCRIPTION	PART #	QTY
001	WALL MOUNT ENCLOSURE, TYPE 4X, 48"x36"x12", SS304	HOF: A48H3612SSLP	1
002	CIRCUIT BREAKER HANDLE	EATON: HM1R24	1
501	PILOT LIGHT, 120VAC, FULL VOLT LED, BLUE, TYPE 4X, PUSH TO TEST	AB: 800H-QRTH2B	1
502	PILOT LIGHT, 120VAC, FULL VOLT LED, BLUE, TYPE 4X, PUSH TO TEST	AB: 800H-QRTH2A	1
503	BOOTLESS FLUSH HEAD PUSHBUTTON, BLACK, 1NO+1NC, TYPE 4X	AB: 800H-AR2A	1
504	3-POSITION SEL. SWITCH, NON-ILLUM., MAINTAINED, TYPE 4X, 2NO+2NC	AB: 800H-JR2B	8
505	PILOT LIGHT, 120VAC, FULL VOLT LED, GREEN, TYPE 4X, PUSH TO TEST	AB: 800H-QRTH2G	8
506	PILOT LIGHT, 120VAC, FULL VOLT LED, RED, TYPE 4X, PUSH TO TEST	AB: 800H-QRTH2R	8
507	POSITION DISPLAY	RL: CUB5PR00	6
901	CUSTOM MAKE LABEL, SEE DETAIL "A"	CUSTOM	33
902	CUSTOM MAKE LABEL, SEE DETAIL "B"	CUSTOM	6

NOTE:
1. LABEL ALL THE DEVICES MOUNTED INSIDE AND OUTSIDE CONTROL PANEL
2. LETTER HEIGHT TO BE 1/8" FOR INDIVIDUAL DEVICES
3. LETTER HEIGHT TO BE 1/4" FOR PANEL DESIGNATION
4. CONTROL PANEL TO BE UL CERTIFIED



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REVISIONS		
REV	DATE	DESC
-	05/11/12	SUBMITTAL
A		
B		
C		

PWS MOTION CONTROL INC.
3990 MIRALOMA AVE,
ANAHEIM CALIFORNIA 92806

JMP Engineering
8856 Broadway
San Antonio
Texas 78217
Tel: (210) 930-6060
Fax: (210) 930-8064
www.jmpeng.com

DESIGN	DETAIL	CHECKED	SHEET	SHEETS
NC	JK	-	002	026

SCALE: N.T.S. DRAWN BY: NAYELI CASTRUITA
DATE: 05/11/12
DRAWING NO.: 102-12JPC0001 REVISION: -

TITLE AND LOCATION:
PWS MOTION CONTROL INC.
DE CORDOVA BEND DAMN
HYDRAULIC POWER UNIT

EXTERNAL PANEL LAYOUT

REV	DESCRIPTION	BY	DATE

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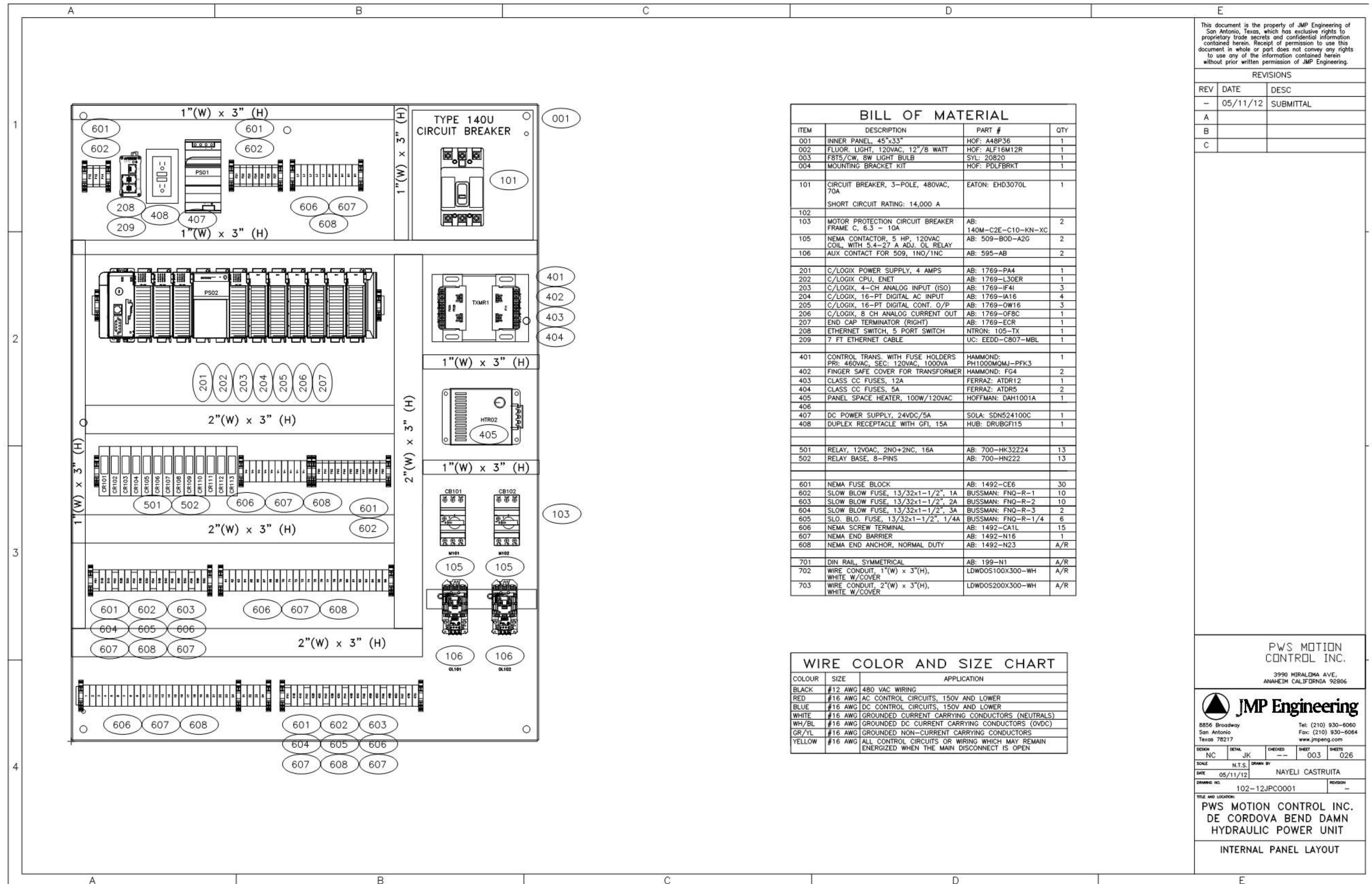
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DE CORDOVA BEND DAM
LOW FLOW OUTLET WORKS REPAIR PROJECT
EXISTING CONTROL PANEL (FOR REFERENCE ONLY)

BRA FILE NO.:	DRAWING NO. R002
DWG LABEL: _S_central_R19.rvt	SHEET NO. 15



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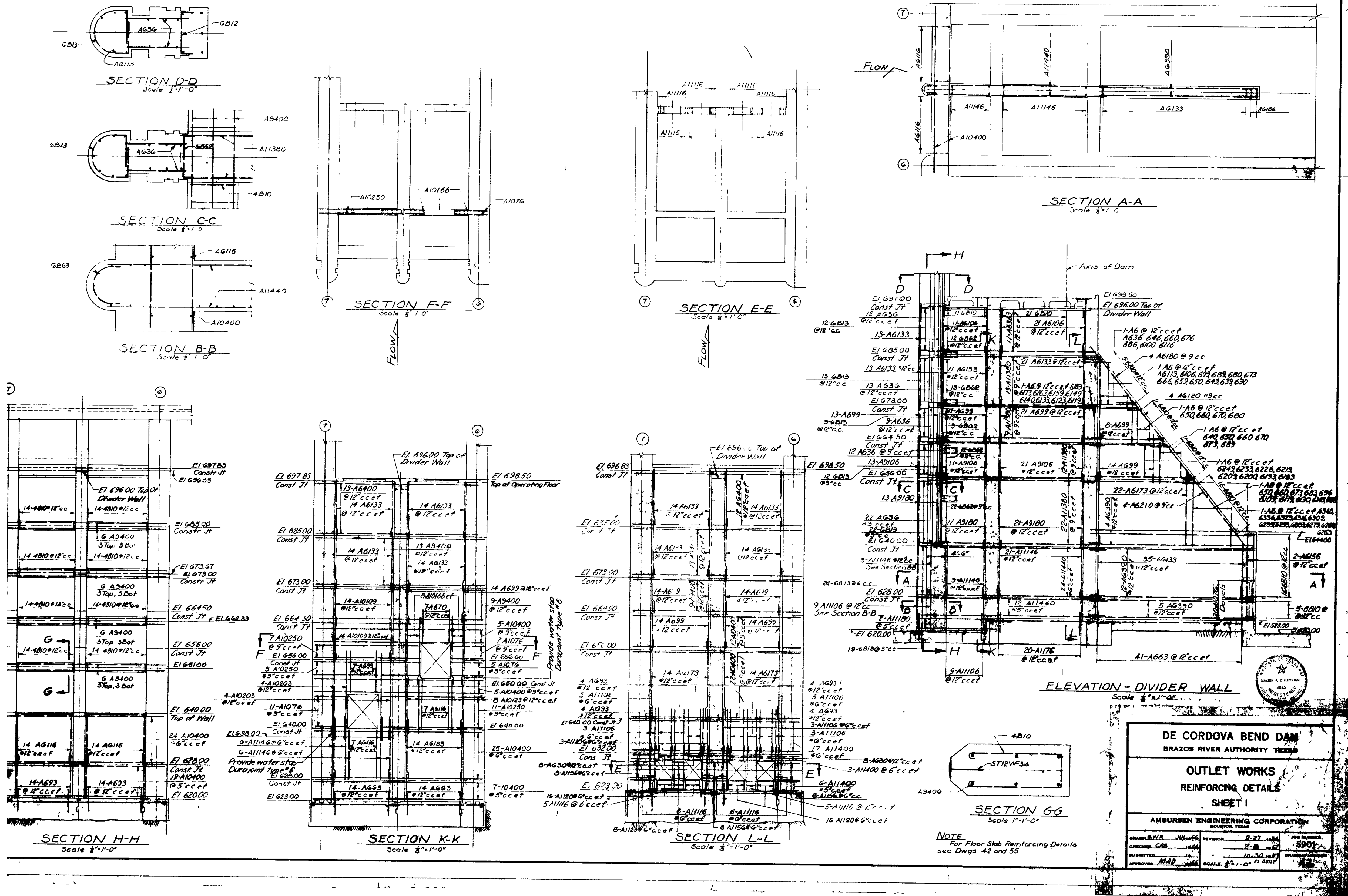
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DE CORDOVA BEND DAM
LOW FLOW OUTLET WORKS REPAIR PROJECT
EXISTING CONTROL PANEL (FOR REFERENCE ONLY)

BRA FILE NO.:
DWG LABEL:
_S_central_R19.rvt

DRAWING NO. R003
SHEET NO. 16



Project Number: 21-05-1219
5/3/2021 6:14:40 AM
Local File: BIM 360//0663396 - De Cordova Low Flow/66396_Central_R20_BIM360.rvt
S_central_R19.rvt

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DESIGNED BY: NA

REVIEWED BY: NA

APPROVED BY:

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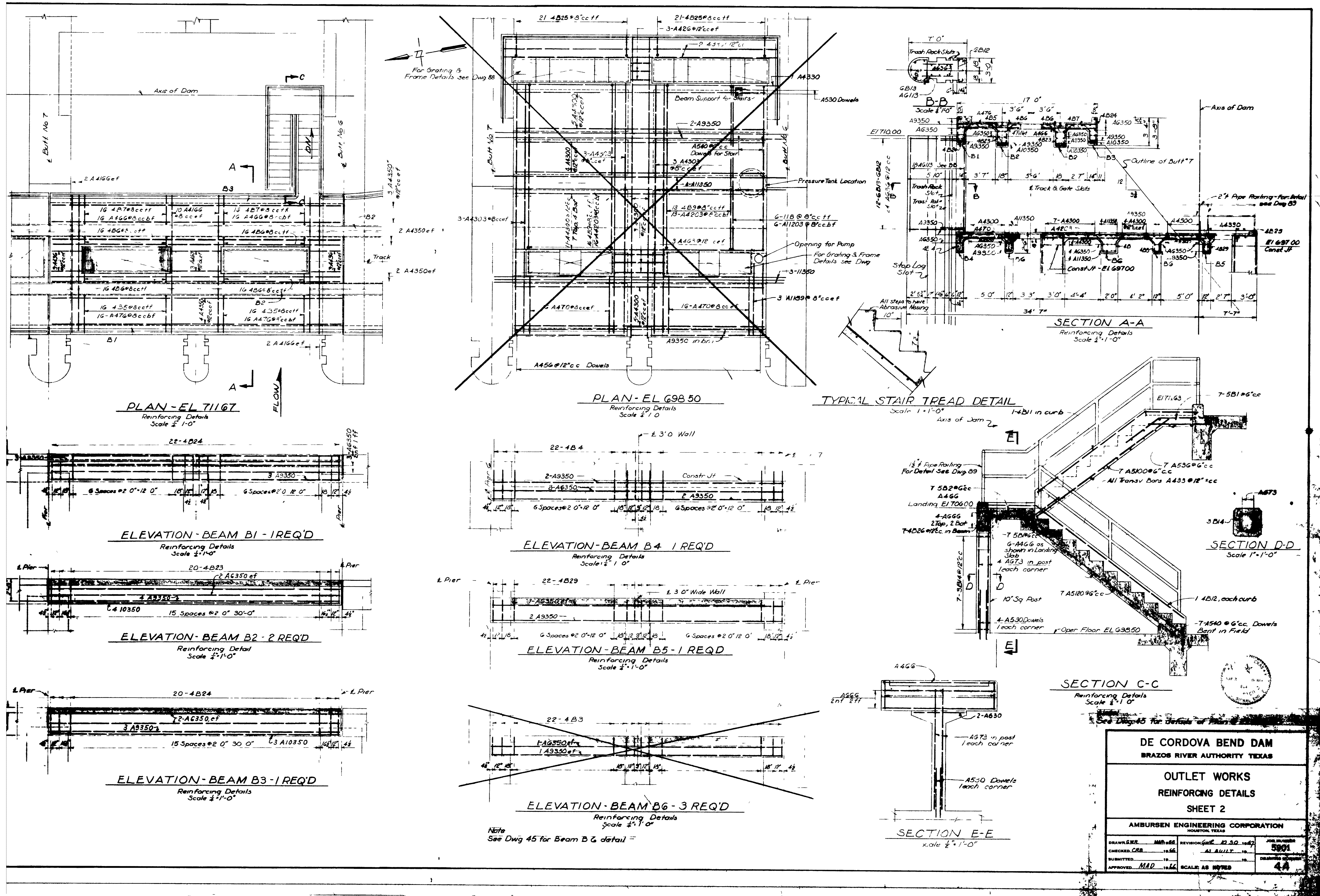


DE CORDOVA BEND DAM
LOW FLOW OUTLET WORKS REPAIR PROJECT
REINFORCING RECORD DRAWINGS (FOR REFERENCE
ONLY)

BRA FILE NO.:
DWG LABEL:
S_central_R19.rvt

DRAWING NO.
R004

SHEET NO. 17



REV	DESCRIPTION	BY	DATE

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APPROVED BY:	
DATE:	4/30/2021

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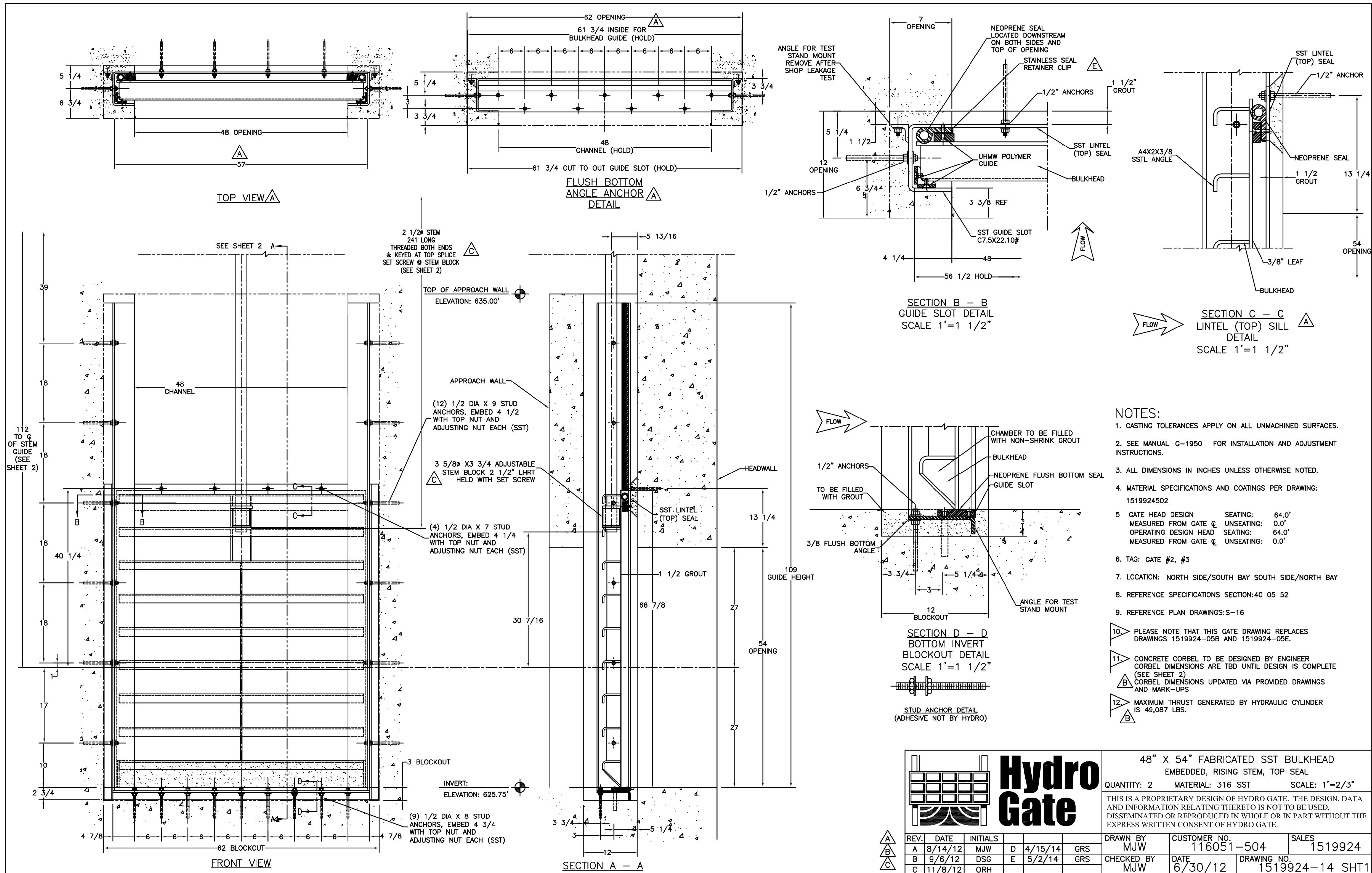


DE CORDOVA BEND DAM
LOW FLOW OUTLET WORKS REPAIR PROJECT
REINFORCING RECORD DRAWINGS (FOR REFERENCE ONLY)

BRA FILE NO.:	DRAWING NO. R005
DWG LABEL: _s_central_R19.rvt	SHEET NO. 18

Local File:BM 360\066396 - De Cordova Low Flow\66396_Central_R20_BM360.rvt
5/3/2021 6:14:42 AM

Project Number: 21-05-1219
5/3/2021 6:14:42 AM



REV	DESCRIPTION	BY	DATE

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DESIGNED BY: NA
REVIEWED BY: NA
APPROVED BY:
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DE CORDOVA BEND DAM
LOW FLOW OUTLET WORKS REPAIR PROJECT
EXISTING 48"x54" GATE 3 DRAWING (FOR REFERENCE ONLY)

BRA FILE NO.:
DWG LABEL:
SHEET NO. 19

DRAWING NO. R006

Project Number: 21-05-1219
5/3/2021 6:14:57 AM
Local File:BM 360\066396 - De Cordova Low Flow\66396_Central_R20_BM360.rvt
\\s_central_R19.rvt

							GATE 1				GATE 2				GATE 3				GATE 4				GATE 5				GATE 6			
TEST NO.	GATE NO.	DESCRIPTION	SPECIFICATION SECTION	BULKHEAD IN PLACE?	WET OR DRY TEST	CONTROL MODE	TEST GATE 1?	START (%)1	TO (%)1	END (%)1	TEST GATE 2?	START (%)2	TO (%)2	END (%)2	TEST GATE 3?	START (%)3	TO (%)3	END (%)3	TEST GATE 4?	START (%)4	TO (%)4	END (%)4	TEST GATE 5?	START (%)5	TO (%)5	END (%)5	TEST GATE 6?	START (%)6	TO (%)6	END (%)6
1	GATE 5	DRY TEST	35 22 25 ARTICLE 3.04.H.1	YES	DRY	LOCAL	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	YES	0%	10%	0%	NO	-	-	-
2	GATE 6	DRY TEST	35 22 25 ARTICLE 3.04.H.1	YES	DRY	LOCAL	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	YES	0%	10%	0%
3	GATE 5	DRY TEST	35 22 25 ARTICLE 3.04.H.2	YES	DRY	LOCAL	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	YES	0%	50%	0%	NO	-	-	-
4	GATE 6	DRY TEST	35 22 25 ARTICLE 3.04.H.2	YES	DRY	LOCAL	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	YES	0%	50%	0%
5	GATE 5	DRY TEST	35 22 25 ARTICLE 3.04.H.3	YES	DRY	LOCAL	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	YES	0%	100%	0%	NO	-	-	-
6	GATE 5	DRY TEST	35 22 25 ARTICLE 3.04.H.3	YES	DRY	LOCAL	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	YES	0%	100%	0%	NO	-	-	-
7	GATE 6	DRY TEST	35 22 25 ARTICLE 3.04.H.3	YES	DRY	LOCAL	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	YES	0%	100%	0%
8	GATE 6	DRY TEST	35 22 25 ARTICLE 3.04.H.3	YES	DRY	LOCAL	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	YES	0%	100%	0%
9	GATE 5	DRY TEST	35 22 25 ARTICLE 3.04.H.4	YES	DRY	REMOTE	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	YES	0%	100%	0%	NO	-	-	-
10	GATE 5	DRY TEST	35 22 25 ARTICLE 3.04.H.4	YES	DRY	REMOTE	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	YES	0%	100%	0%	NO	-	-	-
11	GATE 6	DRY TEST	35 22 25 ARTICLE 3.04.H.4	YES	DRY	REMOTE	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	YES	0%	100%	0%
12	GATE 6	DRY TEST	35 22 25 ARTICLE 3.04.H.4	YES	DRY	REMOTE	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	YES	0%	100%	0%
13	GATE 5	PARTIAL HEAD TEST	35 22 25 ARTICLE 3.04.I.2	YES	WET	LOCAL	NO	10%	-	-	NO	10%	-	-	NO	10%	-	-	NO	10%	-	-	YES	0%	10%	0%	NO	-	-	-
14	GATE 6	PARTIAL HEAD TEST	36 22 25 ARTICLE 3.04.I.3	YES	WET	LOCAL	NO	10%	-	-	NO	10%	-	-	NO	10%	-	-	NO	10%	-	-	NO	-	-	-	YES	0%	10%	0%
15	GATE 5	PARTIAL HEAD TEST	35 22 25 ARTICLE 3.04.I.4	YES	WET	LOCAL	NO	10%	-	-	NO	10%	-	-	NO	10%	-	-	NO	10%	-	-	YES	0%	50%	0%	NO	-	-	-
16	GATE 6	PARTIAL HEAD TEST	35 22 25 ARTICLE 3.04.I.4	YES	WET	LOCAL	NO	10%	-	-	NO	10%	-	-	NO	10%	-	-	NO	10%	-	-	NO	-	-	-	YES	0%	50%	0%
17	GATE 5	FULL HEAD TEST	35 22 25 ARTICLE 3.04.J	NO	WET	LOCAL	NO	10%	-	-	NO	10%	-	-	NO	10%	-	-	NO	10%	-	-	YES	0%	10%	0%	NO	-	-	-
18	GATE 5	FULL HEAD TEST	35 22 25 ARTICLE 3.04.J	NO	WET	LOCAL	NO	10%	-	-	NO	10%	-	-	NO	10%	-	-	NO	10%	-	-	YES	0%	20%	0%	NO	-	-	-
19	GATE 5	FULL HEAD TEST	35 22 25 ARTICLE 3.04.J	NO	WET	REMOTE	NO	10%	-	-	NO	10%	-	-	NO	10%	-	-	NO	10%	-	-	YES	0%	100%	0%	NO	-	-	-
20	GATE 6	FULL HEAD TEST	35 22 25 ARTICLE 3.04.J	NO	WET	LOCAL	NO	10%	-	-	NO	10%	-	-	NO	10%	-	-	NO	10%	-	-	NO	-	-	-	YES	0%	10%	0%
21	GATE 6	FULL HEAD TEST	35 22 25 ARTICLE 3.04.J	NO	WET	LOCAL	NO	10%	-	-	NO	10%	-	-	NO	10%	-	-	NO	10%	-	-	NO	-	-	-	YES	0%	20%	0%
22	GATE 6	FULL HEAD TEST	35 22 25 ARTICLE 3.04.J	NO	WET	REMOTE	NO	10%	-	-	NO	10%	-	-	NO	10%	-	-	NO	10%	-	-	NO	-	-	-	YES	0%	100%	0%
23	GATE 1	DRY TEST	41 24 26 ARTICLE 3.02.G	YES	DRY	LOCAL	YES	0%	10%	0%	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-
24	GATE 1	DRY TEST	41 24 26 ARTICLE 3.02.G	YES	DRY	LOCAL	YES	0%	50%	0%	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-
25	GATE 1	DRY TEST	41 24 26 ARTICLE 3.02.G	YES	DRY	LOCAL	YES	0%	100%	0%	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-
26	GATE 1	DRY TEST	41 24 26 ARTICLE 3.02.G	YES	DRY	LOCAL	YES	0%	100%	0%	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-
27	GATE 1	DRY TEST	41 24 26 ARTICLE 3.02.G	YES	DRY	REMOTE	YES	0%	100%	0%	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-
28	GATE 1	DRY TEST	41 24 26 ARTICLE 3.02.G	YES	DRY	REMOTE	YES	0%	100%	0%	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-
29	GATE 2	DRY TEST	41 24 26 ARTICLE 3.02.H	YES	DRY	LOCAL	NO	-	-	-	YES	0%	10%	0%	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-
30	GATE 2	DRY TEST	41 24 26 ARTICLE 3.02.H	YES	DRY	LOCAL	NO	-	-	-	YES	0%	50%	0%	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-
31	GATE 2	DRY TEST	41 24 26 ARTICLE 3.02.H	YES	DRY	LOCAL	NO	-	-	-	YES	0%	100%	0%	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-
32	GATE 2	DRY TEST	41 24 26 ARTICLE 3.02.H	YES	DRY	LOCAL	NO	-	-	-	YES	0%	100%	0%	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-
33	GATE 2	DRY TEST	41 24 26 ARTICLE 3.02.H	YES	DRY	REMOTE	NO	-	-	-	YES	0%	100%	0%	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-
34	GATE 2	DRY TEST	41 24 26 ARTICLE 3.02.H	YES	DRY	REMOTE	NO	-	-	-	YES	0%	100%	0%	NO	-	-	-	NO	-	-	-	NO	-	-	-	NO	-	-	-
35	GATE 3	DRY TEST	41 24 26 ARTICLE 3.02.H	YES	DRY	LOCAL	NO	-	-	-	NO	-	-	-	YES	0%	10%	0%	NO	-	-	-	NO	-	-	-	NO	-	-	-
36	GATE 3	DRY TEST	41 24 26 ARTICLE 3.02.H	YES	DRY	LOCAL	NO	-	-	-	NO	-	-	-	YES	0%	50%	0%	NO	-	-	-	NO	-	-	-	NO	-	-	-
37	GATE 3	DRY TEST	41 24 26 ARTICLE 3.02.H	YES	DRY	LOCAL	NO	-	-	-	NO	-	-	-	YES	0%	100%	0%	NO	-	-	-	NO	-	-	-	NO	-	-	-
38	GATE 3	DRY TEST	41 24 26 ARTICLE 3.02.H	YES	DRY	LOCAL	NO	-	-	-	NO	-	-	-	YES	0%	100%	0%	NO	-	-	-	NO	-	-	-	NO	-	-	-
39	GATE 3	DRY TEST	41 24 26 ARTICLE 3.02.H	YES	DRY	REMOTE	NO	-	-	-	NO	-	-	-	YES	0%	100%	0%	NO	-	-	-	NO	-	-	-	NO	-	-	-
40	GATE 3	DRY TEST	41 24 26 ARTICLE 3.02.H	YES	DRY	REMOTE	NO	-	-	-	NO	-	-	-	YES	0%	100%	0%	NO	-	-	-	NO	-	-	-	NO	-	-	-
41	GATE 4	DRY TEST	41 24 26 ARTICLE 3.02.H	YES	DRY	LOCAL	NO	-	-	-	NO	-	-	-	NO	-	-	-	YES	0%	10%	0%	NO	-	-	-	NO	-	-	-
42	GATE 4	DRY TEST	41 24 26 ARTICLE 3.02.H	YES	DRY	LOCAL</																								