

**CONTRACT DOCUMENTS
FOR CONSTRUCTION OF
ITB #26029-B FCWS – ALUM
SYSTEM UPGRADES**



**Issued for Construction
September 2025**



Prepared For:

Fayette County Water System
245 McDonough Rd., Fayetteville, GA 30214
(770) 461-1146



Prepared By:

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Design Professional Seals

00 01 07 DESIGN PROFESSIONAL SEALS

	Specification Sections Sealed
	Division 00 Bidding and Contracting Requirements
Michael Diaz, PE Arcadis U.S. Inc.	

	Specification Sections Sealed
	Division 01 General Requirements Division 02 Site Construction Division 09 Finishes Division 26 Electrical Division 40 Process Integration
Thomas Powell, PE Arcadis U.S. Inc.	

END OF SECTION 00 01 07

Table of Contents

SECTION 00 01 10

TABLE OF CONTENTS

Section	Title
Division 00	General Requirements
00 01 01	Project Cover Sheet
00 01 07	Design Professional Seals
00 01 10	Table of Contents
00 11 13	Invitation to Bid
00 21 13	Instructions to Bidders
00 41 13	Bid Form
00 43 13	Bid Bond (Penal Sum Form)
00 45 13	Qualifications Statement
00 52 13	Agreement
00 52 14	Additional Terms and Conditions
00 61 13	Performance Bond
00 61 16	Payment Bond
00 73 01	Supplementary Conditions
Division 01	General Requirements
01 11 13	Summary of Work
01 13 13	Milestones
01 14 16	Coordination with Owner's Operations
01 22 13	Measurement and Payment
01 25 00	Substitution Procedures
01 26 00	Contract Modification Procedures
01 29 73	Schedule of Values
01 29 76	Progress Payment Procedures
01 31 13	Project Coordination
01 31 18	Pre-construction Conference
01 31 19	Progress Meetings
01 31 26	Electronic Communication Protocols
01 32 16	Progress Schedule
01 32 33	Photographic Documentation
01 33 00	Submittal Procedures
01 35 23	Safety Requirements
01 41 24	Permit Requirements
01 42 00	References
01 43 00	Quality Assurance
01 51 05	Temporary Utilities

Table of Contents

Section	Title
01 57 33	Security
01 61 00	Common Product Requirements
01 65 00	Product Delivery Requirements
01 66 00	Product Storage and Handling Requirements
01 71 33	Protection of Work and Property
01 73 19	Installation
01 73 29	Cutting and Patching
01 74 05	Cleaning
01 74 19	Construction Waste Management and Disposal
01 75 11	Checkout and Startup Procedures
01 77 19	Closeout Requirements
01 78 23	Operations and Maintenance Data
01 78 36	Warranties
01 78 39	Project Record Documents
01 78 43	Spare Parts and Extra Materials
01 79 23	Instruction of Operations and Maintenance Personnel
Division 02	Site Construction
02 41 00	Demolition
Division 09	Finishes
09 91 00	Painting
Division 26	Electrical
26 05 05	General Provisions for Electrical Systems
26 05 19	Low voltage Electrical Power Conductors and Cables
26 05 23	Instrumentation and Communication Cable
26 05 26	Grounding and Bonding for Electrical Systems
26 05 29	Hangers and Supports for Electrical Systems
26 05 33.13	Rigid Conduits
26 05 33.16	Expansion Deflection Fittings
26 05 33.33	Pull Junction and Terminal Boxes
26 05 53	Identification for Electrical Systems
Division 40	Process Integration
40 60 05	Instrumentation and Controls for Process Systems
40 61 96	Process Control Descriptions

END OF SECTION

October 1, 2025

Subject: Invitation to Bid ITB #26029-B: FCWS – Alum System Upgrade

Gentlemen/Ladies:

Fayette County, Georgia invites you to submit a bid for construction of the Alum System Improvements at both the Crosstown and South Fayette WTPs. You are invited to submit a bid in accordance with the information contained herein.

A mandatory pre-bid conference will be held at 10:00 a.m., Wednesday, October 29, 2025, at 140 Stonewall Avenue West, Suite 100, Fayetteville, GA 30214. We will then travel to the South Fayette Water Treatment Plant at 875 Antioch Rd, Fayetteville, GA 30215, and to the Crosstown WTP at 3500 TDK Blvd, Peachtree City, Georgia 30269 to provide an opportunity for you to become more familiar with the project, and to ask questions. Companies that attend will be invited to submit bids. Questions concerning this invitation to bid should be addressed to Colette Cobb in writing via email to ccobb@fayettecountyga.gov or fax to (770) 719-5534. **Questions will be accepted until 4:30 p.m., Wednesday November 5, 2025.** Purchasing Department office hours are Monday through Friday 8:00 a.m. to 5:00 p.m. The office telephone number is (770) 305-5420. Please return your response to the following address:

Fayette County Purchasing Department 140
Stonewall Avenue West, Suite 204
Fayetteville, Georgia 30214

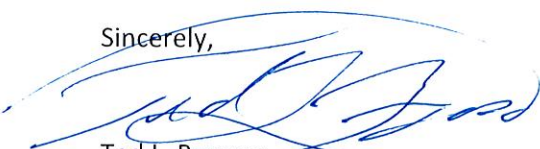
Bid Number: ITB #26029-B
Bid Name: FCWS – Alum System Upgrade

Your envelope *must* be sealed and should show your company's name and address. **Bids will be received at the above address until 3:00 p.m., Tuesday, November 25, 2025** in the Purchasing Department, Suite 204. Bids will be opened at that time. Bids must be signed to be considered. Late bids cannot be considered. Faxed bids or emailed bids cannot be considered.

If you download this invitation to bid from the County's web site, it will be your responsibility to check the web site for any addenda that might be issued for this solicitation. The County cannot not be responsible for a vendor not receiving information provided in any addendum.

Thank you for participating in the solicitation process.

Sincerely,


Ted L. Burgess
Chief Procurement Officer

Checklist of Required Documents

*(Be Sure to Return This Checklist and
the Required Documents in the order listed below)*

ITB #26029-B: FCWS – Alum System Upgrade

Contractor Affidavit under O.C.G.A. § 13-10-91(b)(1)

Exceptions to Specifications

Bid Form (Section 00 41 13)*

Bid Bond (Section 00 43 13)*

Qualifications Statement (Section 00 45 13)

***FAILURE TO INCLUDE THIS ITEM WILL RESULT IN DISQUALIFICATION**

COMPANY NAME: _____

Contractor Affidavit under O.C.G.A. § 13-10-91(b)(l)

The undersigned contractor ("Contractor") executes this Affidavit to comply with O.C.G.A § 13-10-91 related to any contract to which Contractor is a party that is subject to O.C.G.A. § 13-10-91 and hereby verifies its compliance with O.C.G.A. § 13-10-91, attesting as follows:

- a) The Contractor has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program;
- b) The Contractor will continue to use the federal work authorization program throughout the contract period, including any renewal or extension thereof;
- c) The Contractor will notify the public employer in the event the Contractor ceases to utilize the federal work authorization program during the contract period, including renewals or extensions thereof;
- d) The Contractor understands that ceasing to utilize the federal work authorization program constitutes a material breach of Contract;
- e) The Contractor will contract for the performance of services in satisfaction of such contract only with subcontractors who present an affidavit to the Contractor with the information required by O.C.G.A. § 13-10-91(a), (b), and (c);
- f) The Contractor acknowledges and agrees that this Affidavit shall be incorporated into any contract(s) subject to the provisions of O.C.G.A. § 13-10-91 for the project listed below to which Contractor is a party after the date hereof without further action or consent by Contractor; and
- g) Contractor acknowledges its responsibility to submit copies of any affidavits, drivers' licenses, and identification cards required pursuant to O.C.G.A. § 13-10-91 to the public employer within five business days of receipt.

Federal Work Authorization User Identification Number

Date of Authorization

Name of Contractor

ITB #26029-B: FCWS – Alum System
Upgrade
Name of Project

Fayette County, Georgia
Name of Public Employer

I hereby declare under penalty of perjury that the foregoing is true and correct.

Executed on _____, _____, 2025 in _____ (city), _____ (state).

Signature of Authorized Officer or Agent

Printed Name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME
ON THIS THE _____ DAY OF _____, 2025.

NOTARY PUBLIC

My Commission Expires: _____

ITB #26029-B: FCWS – Alum System Upgrade

Please list below any exceptions or clarifications to the specifications of this bid. Explain any exceptions in full.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

COMPANY NAME _____

INSTRUCTIONS TO BIDDERS

Fayette County, Georgia
Fayetteville, Georgia
ITB #26029-B
FCWS – Alum System Upgrade

TABLE OF CONTENTS

	Page
Article 1— Defined Terms.....	1
Article 2— Bidding Documents	1
Article 3— Qualifications of Bidders.....	2
Article 4— Pre-Bid Conference	2
Article 5— Site and Other Areas; Existing Site Conditions; Examination of Site; Owner’s Safety Program; Other Work at the Site	2
Article 6— Bidder’s Representations and Certifications.....	3
Article 7— Interpretations and Addenda	4
Article 8— Bid Security	4
Article 9— Contract Times	5
Article 10— Substitute and “Or Equal” Items.....	5
Article 11— Subcontractors, Suppliers, and Others	5
Article 12— Preparation of Bid	6
Article 13— Basis of Bid	7
Article 14— Submittal of Bid.....	7
Article 15— Modification and Withdrawal of Bid (NOT USED)	8
Article 16— Opening of Bids.....	8
Article 17— Bids to Remain Subject to Acceptance	8
Article 18— Evaluation of Bids and Award of Contract	8
Article 19— Bonds and Insurance.....	9
Article 20— Signing of Agreement.....	9
Article 21— Statutory and Funding-Financing Requirements (NOT USED)	9
Article 22— Sales and Use Taxes	9
Article 23— Contracts to Be Assigned (NOT USED)	9

ARTICLE 1—DEFINED TERMS

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
- A. *Issuing Office*—The office from which the Bidding Documents are to be issued, and which registers plan holders.

ARTICLE 2—BIDDING DOCUMENTS

- 2.01 Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents). See the Agreement for a list of the Contract Documents. It is Bidder's responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misinterpretations resulting from the use of incomplete documents, by Bidder itself or by its prospective Subcontractors and Suppliers.
- 2.02 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use. Authorization to download documents, or other distribution, includes the right for plan holders to print documents solely for their use, and the use of their prospective Subcontractors and Suppliers, provided the plan holder pays all costs associated with printing or reproduction. Printed documents may not be re-sold under any circumstances.
- 2.03 Owner has established a Bidding Documents Website as indicated in the Invitation to Bid. Owner recommends that Bidder obtain a complete set of the Bidding Documents from such website. Bidders may rely that sets of Bidding Documents obtained from the Bidding Documents Website are complete, unless an omission is blatant. Addenda issued by Owner will be posted in the Website.
- 2.04 *Electronic Documents*
- A. After the Contract is awarded, the Owner will provide or direct the Engineer to provide for the use of the Contractor documents that were developed by Engineer as part of the Project design process, as Electronic Documents in native file formats.
1. Electronic Documents that are available in native file format include:
 - a. **Specifications and Drawings**
 2. Release of such documents will be solely for the convenience of the Contractor. No such document is a Contract Document.
 3. Unless the Contract Documents explicitly identify that such information will be available to the Successful Bidder (Contractor), nothing herein will create an obligation on the part of the Owner or Engineer to provide or create such information, and the Contractor is not entitled to rely on the availability of such information in the preparation of its Bid or pricing of the Work. In all cases, the Contractor shall take appropriate measures to verify that any electronic/digital information provided in Electronic Documents is appropriate and adequate for the Contractor's specific purposes.

4. In no case will the Contractor be entitled to additional compensation or time for completion due to any differences between the actual Contract Documents and any related document in native file format.

ARTICLE 3—QUALIFICATIONS OF BIDDERS

- 3.01 Bidder is to submit the following information with its Bid to demonstrate Bidder's qualifications to perform the Work: (Complete the Qualifications Statement included in the Bidding Documents.)
 - A. Written evidence establishing its qualifications such as financial data, previous experience, and present commitments.
 - B. A written statement that Bidder is authorized to do business in the state where the Project is located, or a written certification that Bidder will obtain such authority prior to the Effective Date of the Contract.
 - C. Bidder's state or other contractor license number, if applicable.
 - D. Subcontractor and Supplier qualification information.
 - E. Other required information regarding qualifications.
- 3.02 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.
- 3.03 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.

ARTICLE 4—PRE-BID CONFERENCE

- 4.01 A mandatory pre-bid conference will be held at the time and location indicated in the Advertisement, or invitation to bid. Representatives of Owner and Engineer will be present to discuss the Project. Proposals will not be accepted from Bidders who do not attend the conference. It is each Bidder's responsibility to sign in at the pre-bid conference to verify its participation. Bidders must sign in using the name of the organization that will be submitting a Bid. A list of qualified Bidders that attended the pre-bid conference and are eligible to submit a Bid for this Project will be posted to the County's website.
- 4.02 Information presented at the pre-Bid conference does not alter the Contract Documents. Owner will issue Addenda to make any changes to the Contract Documents that result from discussions at the pre-Bid conference. Information presented, and statements made at the pre-bid conference will not be binding or legally effective unless incorporated in an Addendum.

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

- 5.01 *Site and Other Areas*
 - A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of

materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.

5.02 *Existing Site Conditions*

A. *Subsurface and Physical Conditions;*

1. The Supplementary Conditions identify the following regarding existing conditions at or adjacent to the Site:
 - a. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data.
 - b. Technical Data contained in such reports and drawings.
2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.
3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.

- B. *Underground Facilities:* Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05 of the General Conditions, and not in the drawings referred to in Paragraph 5.02.A of these Instructions to Bidders. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

5.03 *Owner's Safety Program*

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

5.04 *Other Work at the Site*

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

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

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

- A. The Bid Form that each Bidder will submit contains express representations regarding the Bidder's examination of Project documentation, Site visit, and preparation of the Bid, and certifications regarding lack of collusion or fraud in connection with the Bid. Bidder should

review these representations and certifications and assure that Bidder can make the representations and certifications in good faith, before executing and submitting its Bid.

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

ARTICLE 7—INTERPRETATIONS AND ADDENDA

- 7.01 Owner on its own initiative may issue Addenda to clarify, correct, supplement, or change the Bidding Documents.
- 7.02 Bidder shall submit all questions about the meaning or intent of the Bidding Documents to the Owner as indicated in the Invitation to Bid Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda. Questions received less than 7 days prior to the date for opening of Bids may not be answered.
- 7.03 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract Documents unless set forth in an Addendum that expressly modifies or supplements the Contract Documents.

ARTICLE 8—BID SECURITY

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of **5%** percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a Bid bond issued by a surety meeting the requirements of Paragraph 6.01 of the General Conditions. Such Bid bond will be issued in the form included in the Bidding Documents.
- 8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract and furnish the required Contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited, in whole in the case of a penal sum bid bond, and to the extent of Owner's damages in the case of a damages-form bond. Such forfeiture will be Owner's exclusive remedy if Bidder defaults.
- 8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of 7 days after the Effective Date of the

Contract or 90 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.

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

ARTICLE 9—CONTRACT TIMES

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

ARTICLE 10—SUBSTITUTE AND “OR EQUAL” ITEMS

- 10.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, and those “or-equal” or substitute or materials and equipment subsequently approved by Engineer prior to the submittal of Bids and identified by Addendum. No item of material or equipment will be considered by Engineer as an “or-equal” or substitute unless written request for approval has been submitted by Bidder and has been received by Engineer within 10 days of the issuance of the Advertisement for Bids or invitation to Bidders. Each such request must comply with the requirements of Paragraphs 7.05 and 7.06 of the General Conditions, and the review of the request will be governed by the principles in those paragraphs. The burden of proof of the merit of the proposed item is upon Bidder. Engineer’s decision of approval or disapproval of a proposed item will be final. If Engineer approves any such proposed item, such approval will be set forth in an Addendum issued to all registered Bidders. Bidders cannot rely upon approvals made in any other manner.
- 10.02 All prices that Bidder sets forth in its Bid will be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of “or-equal” or substitution requests are made at Bidder’s sole risk.

ARTICLE 11—SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 11.01 A Bidder must be prepared to retain specific Subcontractors and Suppliers for the performance of the Work if required to do so by the Bidding Documents or in the Specifications. If a prospective Bidder objects to retaining any such Subcontractor or Supplier and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.
- 11.02 The apparent Successful Bidder, and any other Bidder so requested, must submit to Owner a list of the Subcontractors or Suppliers proposed for the following portions of the Work within five days after Bid opening:
- A. Instrumentation Supplier
 - B. SCADA Software Integration

C. Painting

- 11.03 If requested by Owner, such list must be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor or Supplier. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor or Supplier, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder will submit a substitute, Bidder's Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.
- 11.04 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors and Suppliers. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor or Supplier, so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.07 of the General Conditions.

ARTICLE 12—PREPARATION OF BID

- 12.01 The Bid Form is included with the Bidding Documents.
- A. All blanks on the Bid Form must be completed by typing or printing with ink and the Bid Form signed in ink. Erasures or alterations must be initialed in ink by the person signing the Bid Form. A Bid price must be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.
 - B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words "No Bid" or "Not Applicable."
- 12.02 If Bidder has obtained the Bidding Documents as Electronic Documents, then Bidder shall prepare its Bid on a paper copy of the Bid Form printed from the Electronic Documents version of the Bidding Documents. The printed copy of the Bid Form must be clearly legible, printed on 8½ inch by 11-inch paper and as closely identical in appearance to the Electronic Document version of the Bid Form as may be practical. The Owner reserves the right to accept Bid Forms which nominally vary in appearance from the original paper version of the Bid Form, providing that all required information and submittals are included with the Bid.
- 12.03 A Bid by a corporation must be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation must be shown.
- 12.04 A Bid by a partnership must be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership must be shown.
- 12.05 A Bid by a limited liability company must be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown.

- 12.06 A Bid by an individual must show the Bidder's name and official address.
- 12.07 A Bid by a joint venture must be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture must have been formally established prior to submittal of a Bid, and the official address of the joint venture must be shown.
- 12.08 All names must be printed in ink below the signatures.
- 12.09 The Bid must contain an acknowledgment of receipt of all Addenda, the numbers of which must be filled in on the Bid Form.
- 12.10 Postal and e-mail addresses and telephone number for communications regarding the Bid must be shown.
- 12.11 The Bid must contain evidence of Bidder's authority to do business in the state where the Project is located, or Bidder must certify in writing that it will obtain such authority within the time for acceptance of Bids and attach such certification to the Bid.
- 12.12 If Bidder is required to be licensed to submit a Bid or perform the Work in the state where the Project is located, the Bid must contain evidence of Bidder's licensure, or Bidder must certify in writing that it will obtain such licensure within the time for acceptance of Bids and attach such certification to the Bid. Bidder's state contractor license number, if any, must also be shown on the Bid Form.

ARTICLE 13—BASIS OF BID

13.01 *Lump Sum*

- A. Bidders must submit a Bid on a lump sum basis as set forth in the Bid Form.

13.02 *Allowances*

- A. For Allowances, the Bid Price must include the amount established by the Owner on the Bid Form

ARTICLE 14—SUBMITTAL OF BID

- 14.01 The Bidding Documents include one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 2 of the Bid Form.
- 14.02 A Bid must be received no later than the date and time prescribed and at the place indicated in the Advertisement or invitation to bid and must be enclosed in a plainly marked package with the Project title, and, if applicable, the designated portion of the Project for which the Bid is submitted, the name and address of Bidder, and must be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid must be enclosed in a separate package plainly marked on the outside with the

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

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

ARTICLE 15—MODIFICATION AND WITHDRAWAL OF BID (NOT USED)

ARTICLE 16—OPENING OF BIDS

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

ARTICLE 17—BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

ARTICLE 18—EVALUATION OF BIDS AND AWARD OF CONTRACT

- 18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner also reserves the right to waive all minor Bid informalities not involving price, time, or changes in the Work.
- 18.02 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible.
- 18.03 If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, whether in the Bid itself or in a separate communication to Owner or Engineer, then Owner will reject the Bid as nonresponsive.
- 18.04 If Owner awards the contract for the Work, such award will be to the responsible Bidder submitting the lowest responsive Bid.
- 18.05 *Evaluation of Bids*
- A. In evaluating Bids, Owner will consider whether the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.
- 18.06 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for

those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.

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

ARTICLE 19—BONDS AND INSURANCE

- 19.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds, other required bonds (if any), and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by required bonds and insurance documentation.
- 19.02 Article 8, Bid Security, of these Instructions, addresses any requirements for providing bid bonds as part of the bidding process.

ARTICLE 20—SIGNING OF AGREEMENT

- 20.01 When Owner issues a Notice of Award to the Successful Bidder, it will be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 15 days thereafter, Successful Bidder must execute and deliver the required number of counterparts of the Agreement and any bonds and insurance documentation required to be delivered by the Contract Documents to Owner. Within 10 days thereafter, Owner will deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 21—STATUTORY AND FUNDING-FINANCING REQUIREMENTS (NOT USED)

ARTICLE 22—SALES AND USE TAXES

- 22.01 Owner is exempt from Georgia state sales and use taxes (O.C.G.A. § 48-8-3) on materials and equipment to be incorporated in the Work. (Exemption Documentation ST-5). Said taxes must be included in the Bid. Refer to Paragraph SC-7.10 of the Supplementary Conditions for additional information.

ARTICLE 23—CONTRACTS TO BE ASSIGNED (NOT USED)

Fayette County, Georgia
Fayetteville, Georgia
FCWS – Alum System Improvements
Invitation to Bid ITB #26029-B

BID FORM

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

ARTICLE 1—OWNER AND BIDDER

- 1.01 This Bid is submitted to: **Fayette County Purchasing Department, 140 Stonewall Avenue West, Suite 204, Fayetteville, Georgia 30214**
- 1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2—ATTACHMENTS TO THIS BID

- 2.01 The required documents to be submitted with and made a condition of this Bid are listed in the Checklist of Required Documents in 00 11 13 Invitation to Bid.

ARTICLE 3—BASIS OF BID—LUMP SUM BIDS

- 3.01 *Lump Sum Bids*
- A. Bidder will complete the Work in accordance with the Contract Documents for the following lump sum (stipulated) price(s), together with any Unit Prices indicated in Paragraph 3.02:
1. Lump Sum Price (Single Lump Sum)

Item No. 1	Crosstown Improvements	\$
Item No. 2	South Fayette Improvements	\$

- 3.02 *Total Bid Price (Lump Sum)*

Total Bid Price (Total of all Lump Sum Bids)	\$
--	----

ARTICLE 4—BASIS OF BID—COST-PLUS FEE (NOT USED)

ARTICLE 5—PRICE-PLUS-TIME BID (NOT USED)

ARTICLE 6—TIME OF COMPLETION

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

ARTICLE 7—BIDDER’S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

7.01 *Bid Acceptance Period*

- A. This Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

7.02 *Instructions to Bidders*

- A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

7.03 *Receipt of Addenda*

- A. Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

ARTICLE 8—BIDDER’S REPRESENTATIONS AND CERTIFICATIONS

8.01 *Bidder’s Representations*

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

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

8.02 *Bidder's Certifications*

A. The Bidder certifies the following:

1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.
2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
3. Bidder has not solicited or induced any individual or entity to refrain from bidding.
4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 8.02.A:
 - a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.
 - b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at

artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.

- c. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.
- d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

BIDDER hereby submits this Bid as set forth above:

Bidder:

(typed or printed name of organization)

By:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(typed or printed)

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

Attest:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(typed or printed)

Address for giving notices:

Bidder's Contact:

Name:

(typed or printed)

Title:

(typed or printed)

Phone:

Email:

Address:

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

BID BOND (PENAL SUM FORM)

Bidder Name: [Full formal name of Bidder] Address <i>(principal place of business)</i> : [Address of Bidder's principal place of business]	Surety Name: [Full formal name of Surety] Address <i>(principal place of business)</i> : [Address of Surety's principal place of business]
Owner Name: Fayette County, Georgia Address <i>(principal place of business)</i> : 140 Stonewall Avenue West Fayetteville, GA 30214	Bid Project <i>(name and location)</i> : FCWS – Alum System Upgrade, 140 Stonewall Avenue West Fayetteville, GA 30214 Bid Due Date: November 25, 2025
Bond Penal Sum: [Amount] Date of Bond: [Date]	
Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.	
Bidder	Surety
_____ <i>(Full formal name of Bidder)</i>	_____ <i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature) (Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<i>Notes: (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.</i>	

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

SECTION 00 45 13
QUALIFICATIONS STATEMENT

ARTICLE 1—GENERAL INFORMATION

1.01 Provide contact information for the Business:

Legal Name of Business:			
Corporate Office			
Name:		Phone number:	
Title:		Email address:	
Business address of corporate office:			
Local Office			
Name:		Phone number:	
Title:		Email address:	
Business address of local office:			

1.02 Provide information on the Business's organizational structure:

Form of Business:	☐ Sole Proprietorship ☐ Partnership ☐ Corporation		
☐ Limited Liability Company ☐ Joint Venture comprised of the following companies:			
1.			
2.			
3.			
Provide a separate Qualification Statement for each Joint Venturer.			
Date Business was formed:		State in which Business was formed:	
Is this Business authorized to operate in the Project location?		☐ Yes ☐ No ☐ Pending	

1.03 Identify all businesses that own Business in whole or in part (25% or greater), or that are wholly or partly (25% or greater) owned by Business:

Name of business:		Affiliation:	
Address:			

Name of business:		Affiliation:	
Address:			
Name of business:		Affiliation:	
Address:			

1.04 Provide information regarding the Business's officers, partners, and limits of authority.

Name:		Title:	
Authorized to sign contracts:	☐ Yes ☐ No	Limit of Authority:	\$
Name:		Title:	
Authorized to sign contracts:	☐ Yes ☐ No	Limit of Authority:	\$
Name:		Title:	
Authorized to sign contracts:	☐ Yes ☐ No	Limit of Authority:	\$
Name:		Title:	

ARTICLE 2—LICENSING

2.01 Provide information regarding licensure for Business:

Name of License:			
Licensing Agency:			
License No:		Expiration Date:	
Name of License:			
Licensing Agency:			
License No:		Expiration Date:	

ARTICLE 3—DIVERSE BUSINESS CERTIFICATIONS (NOT USED)

ARTICLE 4—SAFETY

4.01 Provide information regarding Business's safety organization and safety performance.

Name of Business's Safety Officer:		
Safety Certifications		
Certification Name	Issuing Agency	Expiration

4.02 Provide Worker's Compensation Insurance Experience Modification Rate (EMR), Total Recordable Frequency Rate (TRFR) for incidents, and Total Number of Recorded Manhours (MH) for the last

3 years and the EMR, TRFR, and MH history for the last 3 years of any proposed Subcontractor(s) that will provide Work valued at 10% or more of the Contract Price. Provide documentation of the EMR history for Business and Subcontractor(s).

Year									
Company	EMR	TRFR	MH	EMR	TRFR	MH	EMR	TRFR	MH

ARTICLE 5—FINANCIAL

- 5.01 Provide information regarding the Business's financial stability. Provide the most recent audited financial statement, and if such audited financial statement is not current, also provide the most current financial statement.

Financial Institution:			
Business address:			
Date of Business's most recent financial statement:		☐ Attached	
Date of Business's most recent audited financial statement:		☐ Attached	
Financial indicators from the most recent financial statement			
Contractor's Current Ratio (Current Assets ÷ Current Liabilities)			
Contractor's Quick Ratio ((Cash and Cash Equivalents + Accounts Receivable + Short Term Investments) ÷ Current Liabilities)			

ARTICLE 6—SURETY INFORMATION

- 6.01 Provide information regarding the surety company that will issue required bonds on behalf of the Business, including but not limited to performance and payment bonds.

Surety Name:			
Surety is a corporation organized and existing under the laws of the state of:			
Is surety authorized to provide surety bonds in the Project location?	☐ Yes ☐ No		
Is surety listed in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" published in Department Circular 570 (as amended) by the Bureau of the Fiscal Service, U.S. Department of the Treasury? ☐ Yes ☐ No			
Mailing Address (principal place of business):			

Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

ARTICLE 7—INSURANCE

- 7.01 Provide information regarding Business's insurance company(s), including but not limited to its Commercial General Liability carrier. Provide information for each provider.

Name of insurance provider, and type of policy (CLE, auto, etc.):			
Insurance Provider		Type of Policy (Coverage Provided)	
Are providers licensed or authorized to issue policies in the Project location?		☐ Yes ☐ No	
Does provider have an A.M. Best Rating of A-VII or better?		☐ Yes ☐ No	
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

ARTICLE 8—CONSTRUCTION EXPERIENCE

- 8.01 Provide information that will identify the overall size and capacity of the Business.

Average number of current full-time employees:	
Estimate of revenue for the current year:	
Estimate of revenue for the previous year:	

- 8.02 Provide information regarding the Business's previous contracting experience.

Years of experience with projects like the proposed project:				
As a general contractor:		As a joint venturer:		
Has Business, or a predecessor in interest, or an affiliate identified in Paragraph 1.03:				
Been disqualified as a bidder by any local, state, or federal agency within the last 5 years? ☐ Yes ☐ No				

Been barred from contracting by any local, state, or federal agency within the last 5 years? ☐ Yes ☐ No
Been released from a bid in the past 5 years? ☐ Yes ☐ No
Defaulted on a project or failed to complete any contract awarded to it? ☐ Yes ☐ No
Refused to construct or refused to provide materials defined in the contract documents or in a change order? ☐ Yes ☐ No
Been a party to any currently pending litigation or arbitration? ☐ Yes ☐ No
Provide full details in a separate attachment if the response to any of these questions is Yes.

- 8.03 List all projects currently under contract in Schedule A and provide indicated information.
- 8.04 List a minimum of three and a maximum of six projects completed in the last 5 years in Schedule B and provide indicated information to demonstrate the Business's experience with projects similar in type and cost of construction.
- 8.05 In Schedule C, provide information on key individuals whom Business intends to assign to the Project. Provide resumes for those individuals included in Schedule C. Key individuals include the Project Manager, Project Superintendent, Quality Manager, and Safety Manager. Resumes may be provided for Business's key leaders as well.

ARTICLE 9—REQUIRED ATTACHMENTS

- 9.01 Provide the following information with the Statement of Qualifications:
- A. If Business is a Joint Venture, separate Qualifications Statements for each Joint Venturer, as required in Paragraph 1.02.
 - B. Certification of Business's safety performance if required by Paragraph 4.02.
 - C. Financial statements as required by Paragraph 5.01.
 - D. Attachments providing additional information as required by Paragraph 8.02.
 - E. Schedule A (Current Projects) as required by Paragraph 8.03.
 - F. Schedule B (Previous Experience with Similar Projects) as required by Paragraph 8.04.
 - G. Schedule C (Key Individuals) and resumes for the key individuals listed, as required by Paragraph 8.05.
 - H. Additional items as pertinent.

Qualifications Statement

This Statement of Qualifications is offered by:

Business: _____
(typed or printed name of organization)

By: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(date signed)

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

Attest: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address for giving notices:

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

Phone: _____

Email: _____

Qualifications Statement

Schedule A—Current Projects

Name of Organization					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Qualifications Statement

Schedule B—Previous Experience with Similar Projects

Name of Organization					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Qualifications Statement

Schedule B—Previous Experience with Similar Projects

Name of Organization					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Schedule C—Key Individuals

Project Manager			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	
Project Superintendent			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as project superintendent			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

Qualifications Statement

Safety Manager			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	
Quality Control Manager			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as project superintendent			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

END OF SECTION

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

This Agreement is by and between **Fayette County, Georgia** ("Owner") and [name of contracting entity] ("Contractor").

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

Owner and Contractor hereby agree as follows:

ARTICLE 1—WORK

- 1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows: **Upgrade of the Alum Systems at Both Crosstown and South Fayette Water Treatment Plants.**

ARTICLE 2—THE PROJECT

- 2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: **Remote monitoring and control of the plants' Alum Chemical Feed System.**

ARTICLE 3—ENGINEER

- 3.01 The Owner has retained **Arcadis U.S., Inc.** ("Engineer") to act as Owner's representative, assume all duties and responsibilities of Engineer, and have the rights and authority assigned to Engineer in the Contract.
- 3.02 The part of the Project that pertains to the Work has been designed by **Engineer**.

ARTICLE 4—CONTRACT TIMES

4.01 *Time is of the Essence*

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

4.02 *Contract Times: Days*

- A. The Work will be substantially complete within **335** calendar days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within **365** calendar days after the date when the Contract Times commence to run.

4.05 *Liquidated Damages*

- A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and

Milestones not achieved within the Contract Times, as duly modified (e.g., rain days or other allowed days). These liquidated damages are not established as a penalty but are calculated and agreed upon in advance by the Owner and the Contractor due to the uncertainty and difficulty of making a determination as to the actual and consequential damages which are incurred by the Owner and the general public as a result of the failure on the part of the Contractor to complete the Work on time. The parties also recognize the delays, expense, and difficulties involved in proving, in a legal or arbitration proceeding, the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. *Substantial Completion:* Contractor shall pay Owner \$250 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for Substantial Completion, until the Work is substantially complete.
 2. *Completion of Remaining Work:* After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$250 for each day that expires after such time until the Work is completed and ready for final payment.
 3. *Milestones:* Contractor shall pay Owner \$250 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for achievement of Milestone 1, until Milestone 1 is achieved, or until the time specified for Substantial Completion is reached, at which time the rate indicated in Paragraph 4.05.A.1 will apply, rather than the Milestone rate.
 4. Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive, and will not be imposed concurrently.
- B. If Owner recovers liquidated damages for a delay in completion by Contractor, then such liquidated damages are Owner's sole and exclusive remedy for such delay, and Owner is precluded from recovering any other damages, whether actual, direct, excess, or consequential, for such delay, except for special damages (if any) specified in this Agreement.

ARTICLE 5—CONTRACT PRICE

- 5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents, the amounts that follow, subject to adjustment under the Contract:
- A. For all Work other than Unit Price Work and Allowances, a lump sum as indicated in the Contractor's Bid Form.
 - B. For all Unit Price Work, an amount equal to the sum of the extended prices (established for each separately identified item of Unit Price Work by multiplying the unit price times the actual quantity of that item) as indicated in the Contractor's Bid Form.

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

- C. Total of Lump Sum Amount, Allowances, and Unit Price Work (subject to final Unit Price adjustment) as indicated in the Contractor's Bid Form.

ARTICLE 6—PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

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

6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on the basis of Contractor's Applications for Payment on or about the **25th** day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.
 - 1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract.
 - a. **95** percent of the value of the Work completed (with the balance being retainage).
 - b. **95** percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
- B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to **100** percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less **200** percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

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

6.04 *Consent of Surety*

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

6.05 *Interest*

- A. All amounts not paid when due will bear interest at the rate of **six (6)** percent per annum.

ARTICLE 7—CONTRACT DOCUMENTS

7.01 *Contents*

- A. The Contract Documents consist of all of the following:
 - 1. This Agreement.
 - 2. Additional Terms and Conditions – In the event of any conflict of inconsistency between these Additional Terms and Conditions and any other provisions of the Contract Documents, these Additional Terms and Conditions shall control and govern.
 - 3. Bonds:
 - a. Performance bond (together with power of attorney).
 - b. Payment bond (together with power of attorney).
 - 4. General Conditions.
 - 5. Supplementary Conditions.
 - 6. Specifications as listed in the table of contents of the project manual (copy of list attached).
 - 7. Drawings (not attached but incorporated by reference) consisting of **fourteen** sheets with each sheet bearing the following general title: **FCWS – Alum System Upgrade**
 - 8. Addenda (numbers **[number]** to **[number]**, inclusive).
 - 9. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - a. Notice to Proceed.
 - b. Work Change Directives.
 - c. Change Orders.
 - d. Field Orders.
 - e. Warranty Bond, if any.
- B. The Contract Documents listed in Paragraph 7.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 7.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

ARTICLE 8—REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS

8.01 *Contractor's Representations*

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

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

8.02 *Contractor's Certifications*

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

1. “corrupt practice” means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;
2. “fraudulent practice” means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

8.03 *Standard General Conditions*

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

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

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

Owner:

Contractor:

(typed or printed name of organization)

By: _____
(individual's signature)

Date: _____
(date signed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Address for giving notices:

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

Phone: _____

Email: _____

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

(typed or printed name of organization)

By: _____
(individual's signature)

Date: _____
(date signed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

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

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Address for giving notices:

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

Phone: _____

Email: _____

License No.: _____
(where applicable)

State: _____

SECTION 00 52 14

ADDITIONAL TERMS AND CONDITIONS

ITB # 26029-B: FCWS – Alum System Upgrade

1. **Definitions:** The term “Contractor” as used herein and elsewhere in these Terms and Conditions shall be used synonymously with the term “successful bidder.” The term “County” shall mean Fayette County, Georgia.
2. **Bid is Offer to Contract:** Each bid constitutes an offer to become legally bound to a contract with the County, incorporating the invitation to bid and the bidder’s bid. The binding offer includes compliance with all terms, conditions, special conditions, specifications, and requirements stated in the invitation to bid, except to the extent that a bidder takes written exception to such provisions. All such terms, conditions, special conditions, specifications, and requirements will form the basis of the contract. The bidder should take care to answer all questions and provide all requested information, and to note any exceptions in the bid submission. Failure to observe any of the instructions or conditions in this invitation to bid may result in rejection of the bid.
3. **Binding Offer:** To allow sufficient time for a contract to be awarded, each bid shall constitute a firm offer that is binding for ninety (90) days from the date of the bid opening until the date of contract award, unless the bidder takes exception to this provision in writing.
4. **Bidder’s Questions:** -As appropriate, the County will post answers to questions and/or other information concerning the invitation to bid in the form of an addendum on the County’s website at www.fayettecountyga.gov. It is the responsibility of the prospective bidder to check the website for any addenda issued for this invitation to bid.
5. **References:** Include with your bid a list of three (3) jobs that your company has done that are of the same or similar nature to the work described in this invitation to bid on the form provided. Include all information as requested on the form.
6. **Bid Submission:** Submit your bid, along with any addenda issued by the County, in a sealed opaque envelope with the following information written on the outside of the envelope:
 - a. The bidder’s company name,
 - b. The bid number, which is **#26029-B**, and
 - c. The bid name, which is **FCWS – Alum System Upgrade**.

Mail or deliver one (1) original bid, signed in ink by a company official authorized to make a legal and binding offer, and one (1) copy on a flash drive, to:

Fayette County Government
Purchasing Department
140 Stonewall Avenue West, Suite 204
Fayetteville, GA 30214
Attention: Contracts Administrator

You may submit bids in person, by U.S. mail, or by a commercial carrier. Do not submit bids by facsimile, e-mail, or other electronic means. Once submitted, all bids become the property of Fayette County.

7. **Bid Preparation Costs:** The bidder shall bear all costs associated with preparing the bid.
8. **Late Bids:** Bids not received by the time and date of the scheduled bid opening will not be considered unless the delay is a result of action or inaction by the County.
9. **More than One Bid:** Do not submit alternate bids or options, unless requested or authorized by the County in the Invitation to Bid. If a responder submits more than one bid without being requested or authorized to do so, the County may disqualify the bids from that responder, at the County's option.
10. **Bid Corrections or Withdrawals:** The bidder may correct a mistake, or withdraw a bid, before the bid opening by sending written notification to the Director of Purchasing. Bids may be withdrawn after the bid opening only with written authorization from the Director of Purchasing.
11. **Defects or Irregularities in Bids:** The County reserves the right to waive any defect or irregularity in any bid received. In case of a discrepancy between unit prices and extended prices, the unit price will govern unless the facts or other considerations indicate another basis for correction of the discrepancy.
12. **Prices Held Firm:** Prices quoted shall be firm for the period of the contract, unless otherwise specified in the bid. All prices for commodities, supplies, equipment, or other products shall be quoted FOB Destination, Fayette County or job site.
13. **Brand Name:** If items in this invitation for bid have been identified, described, or referenced by a brand name or trade name description, such identification is intended to be descriptive, but not restrictive and is to indicate the quality and characteristics of products that may be offered. Alternative products may be considered for award if clearly

identified in the bid. Items offered must meet required specifications and must be of a quality which will adequately serve the use and purpose for which intended.

14. **Bidder Substitutions:** See Instructions to Bidders, Article 10.
15. **Samples:** When the County requires samples as part of the bid and vendor selection process, bidders must provide requested samples within the time allotted, and at no cost to the County unless otherwise specified. Any goods provided under contract shall conform to the sample submitted. The County will return samples only at the bidder's request, and at the bidder's expense, if they are not destroyed by testing.
16. **Non-Collusion:** By responding to this invitation to bid, the bidder represents that the bid is not made in connection with any competing bidder, supplier, or service provider submitting a separate response to this invitation to bid and is in all respects fair and without collusion or fraud.
17. **Bid Evaluation:** Award will be made to the lowest responsive, responsible bidder, taking into consideration payment terms, vendor qualifications and experience, quality, references, any exceptions listed, and/or other factors deemed relevant in making the award. The County may make such investigation as it deems necessary to determine the ability of the bidder to perform, and the bidder shall furnish to the County all information and data for this purpose as the County may request. The County reserves the right to reject any bid item, any bid, or all bids, and to re-advertise for bids.
18. **Payment Terms and Discounts:** The County's standard payment terms are Net 30. Any deviation from standard payment terms must be specified in the resulting contract, and both parties must agree on such deviation. Cash discounts offered will be a consideration in awarding the bid, but only if they give the County at least 15 days from receipt of invoice to pay. For taking discounts, time will be computed from the date of invoice acceptance by the County, or the date a correct invoice is received, whichever is the later date. Payment is deemed made, for the purpose of earning the discount, on the date of the check.
19. **Trade Secrets – Confidentiality:** If any person or entity submits a bid or proposal that contains trade secrets, an affidavit shall be included with the bid or proposal. The affidavit shall declare the specific included information which constitutes trade secrets. Any trade secrets must be either (1) placed in a separate envelope, clearly identified and marked as such, or (2) at a minimum, marked in the affidavit or an attached document explaining exactly where such information is, and otherwise marked, highlighted, or made plainly visible. See O.C.G.A. § 50-18-72 (A)(34).
20. **Trade Secrets – Internal Use:** In submitting a bid, the bidder agrees that the County may reveal any trade secret materials contained in the bid to all county staff and officials involved in the selection process, and to any outside consultant or other third parties who

may assist in the selection process. The bidder agrees to hold harmless the County and each of its officers, employees, and agents from all costs, damages, and expenses incurred in connection with refusing to disclose any material which the bidder has designated as a trade secret.

21. **Ethics – Disclosure of Relationships:** Before a proposed contract in excess of \$10,000.00 is recommended for award to the Board of Commissioners or the County Administrator, or before the County renews, extends, or otherwise modifies a contract after it has been awarded, the contractor must disclose certain relationships with any County Commissioner or County Official, or their spouse, mother, father, grandparent, brother, sister, son or daughter related by blood, adoption, or marriage (including in-laws). A relationship that must be reported exists if any of these individuals is a director, officer, partner, or employee, or has a substantial financial interest the business, as described in Fayette County Ordinance Chapter 2, Article IV, Division 3 (Code of Ethics).

If such relationship exists between your company and any individual mentioned above, relevant information must be presented in the form of a written letter to the Director of Purchasing. You must include the letter with any bid, proposal, or price quote you submit to the Purchasing Department.

In the event that a contractor fails to comply with this requirement, the County will take action as appropriate to the situation, which may include actions up to and including rejection of the bid or offer, cancellation of the contract in question, or debarment or suspension from award of a county contract for a period of up to three years.

22. **Contract Execution & Notice to Proceed:** After the Board of Commissioners makes an award, all required documents are received by the County, and the contract is fully executed with signature of both parties, the County will issue a written Notice to Proceed. The County shall not be liable for payment of any work done or any costs incurred by any bidder prior to the County issuing the Notice to Proceed.
23. **Unavailability of Funds:** This contract will terminate immediately and absolutely at such time as appropriated and otherwise unobligated funds are no longer available to satisfy the obligations of the County under the contract.
24. **Insurance:** The successful bidder shall procure and maintain the following insurance, to be in effect throughout the term of the contract, in at least the amounts and limits as follows:
- a. **General Liability Insurance:** \$1,000,000 combined single limit per occurrence, including bodily and personal injury, destruction of property, and contractual liability.

- b. **Automobile Liability Insurance:** \$1,000,000 combined single limit each occurrence, including bodily injury and property damage liability.
- c. **Worker's Compensation & Employer's Liability Insurance:** Workers Compensation as required by Georgia statute.
- d. **Builder's "All Risk" Insurance:** In the event the contractor is performing construction services under the contract, contractor shall procure and maintain "all-risk" builder's insurance, providing coverage for the work performed under the contract, and the materials, equipment or other items incorporated therein, while the same are located at the construction site, stored off-site, or at the place of manufacture. The policy limit shall be at least 100% of the value of the contract, including any additional costs which are normally insured under such policy.

Before a contract with the successful bidder is executed, the successful bidder shall provide Certificates of Insurance for all required coverage. The successful offeror can provide the Certificate of Insurance after award of the contract but must be provided prior to execution of the contract document by both parties. The certificate shall list an additional insured as follows:

Fayette County, Georgia, 140 Stonewall Avenue West, Fayetteville, GA 30214

Arcadis U.S., Inc., 2839 Paces Ferry Rd SE, Suite 1000, Atlanta GA, 30339

- 25. **Bid Bond:** You must include a bid bond with your bid, equal to five percent (5%) of the total amount bid. Bid bonds shall be provided by a surety which appears on Georgia's list of approved sureties administered by the State Insurance Commissioner, or the U.S. Treasury's list of approved bond sureties (Circular 570).
- 26. **Performance and Payment Bonds:** Prior to execution of a contract, the successful bidder shall submit performance and payment bonds each equal to 100 percent of the contract value, provided by a surety which appears on Georgia's list of approved sureties administered by the State Insurance Commissioner, or the U.S. Treasury's list of approved bond sureties (Circular 570).
- 27. **Building Permits:** Work performed for the County requiring building permits by licensed contractors will not have permit fees assessed, although any re-inspection fees for disapproved inspections will be the responsibility of the contractor prior to final inspections and the Certificate of Occupancy or Certificate of Completion being issued.
- 28. **Unauthorized Performance:** The County will not compensate the contractor for work performed unless the work is authorized under the contract, as initially executed, or as

amended.

29. **Assignment of Contract:** Assignment of any contract resulting from this invitation to bid will not be authorized, except as provided in the standard general conditions of the construction contract, section 18.08
30. **Indemnification:** The contractor shall indemnify and save the County and all its officers, agents, and employees harmless from all suits, actions, or other claims of any character, name and description brought for or on account of any damages, losses, or expenses to the extent caused by or resulting from the negligence, recklessness, or intentionally wrongful conduct of the contractor or other persons employed or utilized by the contractor in the performance of the contract. The contractor shall pay any judgment with cost which may be obtained against the County growing out of such damages, losses, or expenses.
31. **Severability:** The invalidity of one or more of the phrases, sentences, clauses, or sections contained in the contract shall not affect the validity of the remaining portion of the contract. If any provision of the contract is held to be unenforceable, then both parties shall be relieved of all obligations arising under such provision to the extent that the provision is unenforceable. In such case, the contract shall be deemed amended to the extent necessary to make it enforceable while preserving its intent.
32. **Delivery Failures:** If the contractor fails to deliver contracted goods or services within the time specified in the contract or fails to replace rejected items in a timely manner, the County shall have authority to make open-market purchases of comparable goods or services. The County shall have the right to invoice the contractor for any excess expenses incurred or deduct such amount from monies owed the contractor. Such purchases shall be deducted from contracted quantities.
33. **Substitution of Contracted Items:** The contractor shall be obligated to deliver products awarded in this contract in accordance with terms and conditions specified herein. If a contractor is unable to deliver the products under the contract, it shall be the contractor's responsibility to obtain prior approval of the ordering agency to deliver an acceptable substitute at the same price quoted in the contractor's original bid. In the event any contractor consistently needs to substitute or refuses to substitute products, the County reserves the right to terminate the contract or invoke the "Delivery Failures" clause stated herein.
34. **Inspection and Acceptance of Deliveries:** The County reserves the right to inspect all goods and products delivered. The County will decide whether to accept or reject items delivered. The inspection shall be conclusive except with respect to latent defects, fraud, or such gross mistakes as shall amount to fraud. Final inspection resulting in acceptance or rejection of the products will be made as soon as practicable, but failure to inspect shall not be construed as a waiver by the County to claim reimbursement or damages for

such products which are later found to be in non-conformance with specifications. Should public necessity demand it, the County reserves the right to use or consume articles delivered which are substandard in quality, subject to an adjustment in price to be determined by the Purchasing Director.

35. **Termination for Cause:** The County may terminate the contract for cause by sending written notice to the contractor of the contractor's default in the performance of any term of this agreement. As appropriate, the County will compensate the contractor for completed performance, and for any partially completed performance as determined by the County to be adequately performed. Termination shall be without prejudice to any of the County's rights or remedies by law.
36. **Termination for Convenience:** The County may terminate the contract for its convenience at any time with 7 days' written notice to the contractor, as stipulated in the standard General Conditions of the contract, section 16.03.
37. **Force Majeure:** Neither party shall be deemed to be in breach of the contract to the extent that performance of its obligations is delayed, restricted, or prevented by reason of any act of God, natural disaster, act of government, or any other act or condition beyond the reasonable control of the party in question.
38. **Governing Law:** This agreement shall be governed in accordance with the laws of the State of Georgia. The parties agree to submit to the jurisdiction in Georgia, and further agree that any cause of action arising under this agreement shall be required to be brought in the appropriate venue in Fayette County, Georgia.

END OF SECTION

PERFORMANCE BOND

Contractor Name: [Full formal name of Contractor] Address <i>(principal place of business)</i> : [Address of Contractor's principal place of business]	Surety Name: [Full formal name of Surety] Address <i>(principal place of business)</i> : [Address of Surety's principal place of business]
Owner Name: Fayette County, Georgia Mailing address <i>(principal place of business)</i> : 140 Stonewall Avenue West Fayetteville, GA 30214	Contract Description <i>(name and location)</i> : FCWS – Alum System Upgrade 140 Stonewall Avenue West Fayetteville, GA 30214 Contract Price: [Amount from Contract] Effective Date of Contract: [Date from Contract]
Bond Bond Amount: [Amount] Date of Bond: [Date] <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i> Modifications to this Bond form: ☐ None ☐ See Paragraph 16	
Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Performance Bond, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.	
Contractor as Principal	Surety
<i>(Full formal name of Contractor)</i> 	<i>(Full formal name of Surety) (corporate seal)</i>
By: <i>(Signature)</i>	By: <i>(Signature)(Attach Power of Attorney)</i>
Name: <i>(Printed or typed)</i>	Name: <i>(Printed or typed)</i>
Title:	Title:
Attest: <i>(Signature)</i>	Attest: <i>(Signature)</i>
Name: <i>(Printed or typed)</i>	Name: <i>(Printed or typed)</i>
Title:	Title:
<i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i>	

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

1. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.
2. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond will arise after:
 - 2.1. The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice may indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 will be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement does not waive the Owner's right, if any, subsequently to declare a Contractor Default;
 - 2.2. The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
 - 2.3. The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.
3. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 does not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.
4. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:
 - 4.1. Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;
 - 4.2. Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;
 - 4.3. Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

- 4.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:
 - 5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
 - 5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.
5. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment, or the Surety has denied liability, in whole or in part, without further notice, the Owner shall be entitled to enforce any remedy available to the Owner.
6. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner will not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety will not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:
 - 6.1. the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
 - 6.2. additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and
 - 6.3. liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.
7. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.
8. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price will not be reduced or set off on account of any such unrelated obligations. No right of action will accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.
9. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
10. Any proceeding, legal or equitable, under this Bond must be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and must be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit will be applicable.
11. Notice to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears.

12. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted therefrom and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.
13. Definitions
- 13.1. *Balance of the Contract Price*—The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
- 13.2. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.
- 13.3. *Contractor Default*—Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.
- 13.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
- 13.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
14. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
15. Modifications to this Bond are as follows: None.

PAYMENT BOND

Contractor Name: [Full formal name of Contractor] Address <i>(principal place of business)</i> : [Address of Contractor's principal place of business]	Surety Name: [Full formal name of Surety] Address <i>(principal place of business)</i> : [Address of Surety's principal place of business]
Owner Name: Fayette County, Georgia Mailing address <i>(principal place of business)</i> : 140 Stonewall Avenue West Fayetteville, GA 30214	Contract Description <i>(name and location)</i> : FCWS – Alum System Upgrade 140 Stonewall Avenue West Fayetteville, GA 30214 Contract Price: [Amount, from Contract] Effective Date of Contract: [Date, from Contract]
Bond Bond Amount: [Amount] Date of Bond: [Date] <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i> Modifications to this Bond form: ☐ None ☐ See Paragraph 18	
Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Payment Bond, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.	
Contractor as Principal	Surety
<i>(Full formal name of Contractor)</i>	<i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature)(Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i>	

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

shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

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

16. Definitions

16.1. *Claim*—A written statement by the Claimant including at a minimum:

16.1.1. The name of the Claimant;

16.1.2. The name of the person for whom the labor was done, or materials or equipment furnished;

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

SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

	Page
Article 1— Definitions and Terminology.....	1
Article 2— Preliminary Matters	1
Article 3— Contract Documents: Intent, Requirements, Reuse	3
Article 4— Commencement and Progress of the Work	3
Article 5— Site, Subsurface and Physical Conditions, Hazardous Environmental Conditions.....	3
Article 6— Bonds and Insurance	4
Article 7— Contractor’s Responsibilities	6
Article 8— Other Work at the Site	7
Article 9— Owner’s Responsibilities	8
Article 10— Engineer’s Status During Construction	8
Article 11— Changes to the Contract	9
Article 12— Claims	9
Article 13— Cost of Work; Allowances, Unit Price Work.....	9
Article 14— Tests and Inspections; Correction, Removal, or Acceptance of Defective Work.....	10
Article 15— Payments to Contractor, Set Offs; Completions; Correction Period	10
Article 16— Suspension of Work and Termination	10
Article 17— Final Resolutions of Disputes	10
Article 18— Miscellaneous	10

SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

These Supplementary Conditions amend or supplement EJCDC® C-700, Standard General Conditions of the Construction Contract (2018). The General Conditions remain in full force and effect except as amended.

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

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

Article 1—DEFINITIONS AND TERMINOLOGY

SC-1.01.A.16 Add the following to Paragraph 1.01.A.16:

The terms "Contractor" and "CONTRACTOR" have the same meaning.

SC-1.01.A.22 Add the following to Paragraph 1.01.A.22:

The terms "Engineer" and "ENGINEER" have the same meaning.

SC-1.01.A.30 Add a new sentence to Paragraph 1.01.A.30 that is to read as follows:

The terms "Owner" and "OWNER" have the same meaning.

SC-1.01.A.40 Add a new sentence to Paragraph 1.01.A.40 that is to read as follows:

Trucking, shipping, and delivery firms, consultants, and entities performing testing or inspection retained by Contractor or any Subcontractor are considered to be Subcontractors.

SC-1.01.A.45 Add a new sentence to Paragraph 1.01.A.45 that is to read as follows:

Entities that rent construction equipment or machinery, but are not incorporated into the Work, are considered to be Suppliers. If such rental entity furnishes both equipment and one or more personnel to operate and maintain the equipment, such entity is a Subcontractor.

Article 2—PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

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

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

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

2.02 *Copies of Documents*

SC-2.02 Amend the first sentence of Paragraph 2.02.A. to read as follows:

Owner shall furnish to Contractor **one** printed copies of the Contract Documents (including one fully signed counterpart of the Agreement), and **one copy** in electronic portable document format (PDF).

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

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

2.06 *Electronic Transmittals*

SC-2.06 Delete Paragraph 2.06.B in its entirety and insert the following in its place:

- B. Electronic Means are established in Specification Section 01 31 26, Electronic Document Protocol.

SC-2.06 Supplement Paragraph 2.06 of the General Conditions by adding the following paragraph:

- D. *Requests by Contractor for Electronic Documents in Other Formats*
1. Release of any Electronic Document versions of the Project documents in formats other than those identified in the Electronic Documents Protocol (if any) or elsewhere in the Contract will be at the sole discretion of the Owner.
 2. To extent determined by Owner, in its sole discretion, to be prudent and necessary, release of Electronic Documents versions of Project documents and other Project information requested by Contractor ("Request") in formats other than those identified in the Electronic Documents Protocol (if any) or elsewhere in the Contract will be subject to the provisions of the Owner's response to the Request, and to the following conditions to which Contractor agrees:
 - a. The content included in the Electronic Documents created by Engineer and covered by the Request was prepared by Engineer as an internal working document for Engineer's purposes solely, and is being provided to Contractor on an "AS IS" basis without any warranties of any kind, including, but not limited to any implied warranties of fitness for any purpose. As such, Contractor is advised and acknowledges that the content may not be suitable for Contractor's application, or may require substantial modification and independent verification by Contractor. The content may include limited resolution of models, not-to-scale schematic representations and symbols, use of notes to convey design concepts in lieu of accurate graphics, approximations, graphical simplifications, undocumented intermediate revisions, and other devices that may affect subsequent reuse.

- b. Electronic Documents containing text, graphics, metadata, or other types of data that are provided by Engineer to Contractor under the request are only for convenience of Contractor. Any conclusion or information obtained or derived from such data will be at the Contractor's sole risk and the Contractor waives any claims against Engineer or Owner arising from use of data in Electronic Documents covered by the Request.
 - c. Contractor shall indemnify and hold harmless Owner and Engineer and their subconsultants from all claims, damages, losses, and expenses, including attorneys' fees and defense costs arising out of or resulting from Contractor's use, adaptation, or distribution of any Electronic Documents provided under the Request.
 - d. Contractor agrees not to sell, copy, transfer, forward, give away or otherwise distribute this information (in source or modified file format) to any third party without the direct written authorization of Engineer, unless such distribution is specifically identified in the Request and is limited to Contractor's subcontractors. Contractor warrants that subsequent use by Contractor's subcontractors complies with all terms of the Contract Documents and Owner's response to Request.
 - e. Contractor agrees to execute ENGINEER's standard agreement for release of electronic files (copy attached to Specification Section 01 n78 39. Record Documents) and shall abide by the provisions of such agreement for release of electronic files.
3. In the event that Owner elects to provide or directs the Engineer to provide to Contractor any Contractor-requested Electronic Document versions of Project information that is not explicitly identified in the Contract Documents as being available to Contractor, the Owner shall be reimbursed by Contractor on an hourly basis (at \$[250 per hour) for any engineering costs necessary to create or otherwise prepare the data in a manner deemed appropriate by Engineer.

Article 3—**CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE**

No suggested Supplementary Conditions in this Article.

Article 4—**COMMENCEMENT AND PROGRESS OF THE WORK**

No suggested Supplementary Conditions in this Article.

Article 5—**SITE, SUBSURFACE AND PHYSICAL CONDITIONS, HAZARDOUS ENVIRONMENTAL CONDITIONS**

5.03 *Subsurface and Physical Conditions*

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

- E. The following table lists the reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data, and specifically identifies the Technical Data in the report upon which Contractor may rely: **If there are no such reports, so indicate in the table.**

Report Title	Date of Report	Technical Data
none		n/a

- F. The following table lists the drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data, and specifically identifies the Technical Data upon which Contractor may rely: **If there are no such drawings, so indicate in the table.**

Drawings Title	Date of Drawings	Technical Data
None		

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

Article 6—**BONDS AND INSURANCE**

6.01 *Performance, Payment, and Other Bonds*

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

1. *Required Performance Bond Form:* The performance bond that Contractor furnishes will be in the form of EJCDC® C-610, Performance Bond (2010, 2013, or 2018 edition).
2. *Required Payment Bond Form:* The payment bond that Contractor furnishes will be in the form of EJCDC® C-615, Payment Bond (2010, 2013, or 2018 edition).

6.02 *Insurance—General Provisions*

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

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

6.03 *Contractor's Insurance*

SC-6.03 Supplement Paragraph 6.03 with the following provisions after Paragraph 6.03.C:

- D. *Other Additional Insureds:* As a supplement to the provisions of Paragraph 6.03.C of the General Conditions, the commercial general liability, automobile liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies must include as additional insureds (in addition to Owner and Engineer) the following: None.
- E. *Workers' Compensation and Employer's Liability:* Contractor shall purchase and maintain workers' compensation as required by Georgia statute.

- F. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against claims for:
1. damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees,
 2. damages insured by reasonably available personal injury liability coverage, and
 3. damages because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- G. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy must be written on a 1996 (or later) Insurance Services Organization, Inc. (ISO) commercial general liability form (occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage.
 - a. Such insurance must be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
 2. Blanket contractual liability coverage, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Severability of interests and no insured-versus-insured or cross-liability exclusions.
 4. Underground, explosion, and collapse coverage.
 5. Personal injury coverage.
 6. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together). If Contractor demonstrates to Owner that the specified ISO endorsements are not commercially available, then Contractor may satisfy this requirement by providing equivalent endorsements.
 7. For design professional additional insureds, ISO Endorsement CG 20 32 07 04 "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- H. *Commercial General Liability—Excluded Content:* The commercial general liability insurance policy, including its coverages, endorsements, and incorporated provisions, must not include any of the following:
1. Any modification of the standard definition of "insured contract" (except to delete the railroad protective liability exclusion if Contractor is required to indemnify a railroad or others with respect to Work within 50 feet of railroad property).
 2. Any exclusion for water intrusion or water damage.
 3. Any provisions resulting in the erosion of insurance limits by defense costs other than those already incorporated in ISO form CG 00 01.
 4. Any exclusion of coverage relating to earth subsidence or movement.

5. Any exclusion for the insured's vicarious liability, strict liability, or statutory liability (other than worker's compensation).
6. Any limitation or exclusion based on the nature of Contractor's work.
7. Any professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.

I. *Commercial General Liability—Minimum Policy Limits*

Commercial General Liability	Policy limits of not less than:
Bodily Injury and Property Damage—Each Occurrence	\$1,000,000

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

Automobile Liability	Policy limits of not less than:
Combined Single Limit	
Combined Single Limit (Bodily Injury and Property Damage)	\$1,000,000

Article 7—CONTRACTOR'S RESPONSIBILITIES

7.02 *Supervision and Superintendence*

SC-7.02 Amend Paragraph 7.02.B of the General Conditions by adding the following sentence:

Unless the Owner otherwise agrees in writing, 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.

7.03 *Labor; Working Hours*

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

1. Regular working hours will be Monday through Friday, excluding holidays, occurring between the hours of 7:00 AM and 7:00 PM, unless restricted otherwise. Contractor shall establish a 40-hour work week with regular scheduled work times, e.g., four 10-hour days or five 8-hour days, within the hours and days allowed above. Approval for specific work outside regular scheduled work times shall be requested no less than 48 hours prior to the requested work period. Contractor shall request approval of changes in regular scheduled work times no less than one week prior to the desired change. Occasional unscheduled overtime on weekdays may be permitted provided reasonable notice is given to Engineer .

2. Owner's legal holidays are: New Year's Day, Martin Luther King Day, Memorial Day, Juneteenth, Independence Day, Labor Day, Veterans Day, Thanksgiving, Day After Thanksgiving, Christmas Eve, and Christmas Day.

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

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

7.10 *Taxes*

SC-7.10 Add a new paragraph immediately after Paragraph 7.10.A:

- A. Owner is exempt from payment of sales and compensating use taxes of the State of **Georgia** and of cities and counties thereof on all materials to be incorporated into the Work.
 1. Contractor will furnish the required invoices to Owner for use in the purchase of supplies and materials to be incorporated into the Work, for submittal to the State.

7.13 *Safety and Protection*

SC-7.13 Amend the second sentence of Paragraph 7.13.G by deleting the words "...the Supplementary Conditions or Specifications." and replace with the words Specification Section 01 35 23, Safety Requirements".:

7.14 *Hazard Communication Programs*

SC-7.14 Add the following new paragraph immediately after Paragraph 7.14.A:

- B. Contractor shall provide a centralized location for the maintenance of the safety data sheets or other hazard communication information required to be made available by any employer on the Site. Location of the safety data sheets or other hazard communication information shall be readily accessible to the employees of all employers on the Site.

Article 8—**OTHER WORK AT THE SITE**

No suggested Supplementary Conditions in this Article.

Article 9—**OWNER'S RESPONSIBILITIES**

No suggested Supplementary Conditions in this Article.

Article 10—**ENGINEER'S STATUS DURING CONSTRUCTION**

10.03 *Resident Project Representative*

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

- C. The Resident Project Representative (RPR) will be Engineer's representative at the Site. RPR's dealings in matters pertaining to the Work in general will be with Engineer and Contractor. RPR's dealings with Subcontractors will only be through or with the full knowledge or approval of Contractor. The RPR will:
1. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings (but not including Contractor's safety meetings), and as appropriate prepare and circulate copies of minutes thereof.
 2. *Safety Compliance:* Comply with Site safety programs, as they apply to RPR, and if required to do so by such safety programs, receive safety training specifically related to RPR's own personal safety while at the Site.
 3. *Liaison*
 - a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for Contractor's proper execution of the Work.
 4. *Review of Work; Defective Work*
 - a. Conduct on-Site observations of the Work to assist Engineer in determining, to the extent set forth in Paragraph 10.02, if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Observe whether any Work in place appears to be defective.
 - c. Observe whether any Work in place should be uncovered for observation, or requires special testing, inspection or approval.
 5. *Inspections and Tests*
 - a. Observe Contractor-arranged inspections required by Laws and Regulations, including but not limited to those performed by public or other agencies having jurisdiction over the Work.
 - b. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Work.
 6. *Payment Requests:* Review Applications for Payment with Contractor.
 7. *Completion*
 - a. Participate in Engineer's visits regarding Substantial Completion.
 - b. Assist in the preparation of a punch list of items to be completed or corrected.

- c. Participate in Engineer's visit to the Site in the company of Owner and Contractor regarding completion of the Work, and prepare a final punch list of items to be completed or corrected by Contractor.
 - d. Observe whether items on the final punch list have been completed or corrected.
- D. The RPR will not:
 - 1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
 - 2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
 - 3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
 - 4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction.
 - 5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
 - 6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
 - 7. Authorize Owner to occupy the Project in whole or in part.

Article 11—CHANGES TO THE CONTRACT

No suggested Supplementary Conditions in this Article.

Article 12—CLAIMS

SC-12.01 Delete Paragraph 12.01.D Mediation in its entirety and renumber subsequent paragraphs.

Article 13—COST OF WORK; ALLOWANCES, UNIT PRICE WORK

13.01 *Cost of the Work*

SC-13.01 Supplement Paragraph 13.01.B.5.c.(2) by adding the following sentence:

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

SC-13.01 Supplement Paragraph 13.01.C.2 by adding the following definition of small tools and hand tools:

- a. For purposes of this paragraph, "small tools and hand tools" means any tool or equipment whose current price if it were purchased new at retail would be less than \$500.

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

No suggested Supplementary Conditions in this Article.

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

15.01 *Progress Payments*

SC-15.01 Amend Paragraph 15.01D.1 of the General Conditions by replacing “Ten days” with “Thirty days”.

15.03 *Substantial Completion*

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

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

Article 16—**SUSPENSION OF WORK AND TERMINATION**

No suggested Supplementary Conditions in this Article.

Article 17—**FINAL RESOLUTIONS OF DISPUTES**

17.01 *Methods and Procedures*

SC-17.01 Amend Paragraph 17.01.B.3 of the General Conditions by adding the following sentence:

The parties agree to submit to the jurisdiction in Georgia, and further agree that any cause of action arising under this agreement shall be required to be brought in the appropriate venue in Fayette County, Georgia.

17.02 *Attorneys’ Fees*

SC-17.02 Add the following new paragraph immediately after Paragraph 17.01.

17.02 *Attorneys’ Fees*

- A. For any matter subject to final resolution under this Article, the prevailing party shall be entitled to an award of its attorneys’ fees incurred in the final resolution proceedings, in an equitable amount to be determined in the discretion of the court, arbitrator, arbitration panel, or other arbiter of the matter subject to final resolution, taking into account the parties’ initial demand or defense positions in comparison with the final result.

Article 18—**MISCELLANEOUS**

SC-18.11 Add the following new paragraph immediately after Paragraph 18.10:

SC-18.11 *Confidential Information*

- A. All Drawings, Specifications, technical data, and other information furnished to Contractor either by Owner or Engineer or developed by Contractor or others in connection with the Work are, and will remain, the property of Owner or Engineer, and shall not be copied or otherwise reproduced or used in any way except in connection with the Work, or disclosed to third parties or used in any manner detrimental to the interests of Owner or Engineer.
- B. The following information is not subject to the above confidentiality requirements:
 - 1. information in the public domain through no action of Contractor in breach of the Contract Documents; or
 - 2. information lawfully possessed by Contractor before receipt from Owner or Engineer; or
 - 3. information required to be disclosed by Laws or Regulations, or by a court or agency of competent jurisdiction. However, in the event Contractor shall be so required to disclose such information, Contractor shall, prior to disclosure, provide reasonable notice to Owner and Engineer, who shall have the right to interpose all objections Owner may have to the disclosure of such information.
- C. Contractor shall not disclose to any third party the nature of its Work on the Project, nor engage in publicity or public media disclosures with respect to the Project without the prior written consent of Owner.

SECTION 01 11 13

SUMMARY OF WORK

PART 1 - GENERAL

1.1 - SECTION INCLUDES

- A. This Section includes the following Articles:
 - 1.02 Location and Description of Work
 - 1.03 Work by Others
 - 1.04 Work by Owner
 - 1.05 Sequence and Progress of Work
 - 1.06 Contractor's Use of Site
 - 1.07 Easements and Rights-Of-Way
 - 1.08 Notices to Owners and Authorities of Properties Adjacent to the Work
 - 1.09 Salvage of Materials and Equipment

1.2 LOCATION AND DESCRIPTION OF WORK

- A. The Work is located at both FCWS Crosstown and South Fayette Water Treatment Plants. The Work to be performed under this Contract includes, but is not limited to, constructing the Work described below and all related appurtenances. The Work includes, but is not limited to, the following:
 - 1. Clear site as necessary for removal, repair, and/or installation of the proposed improvements and maintain erosion control measures throughout the duration of the project for impacted area.
 - 2. Removal of existing level monitor for storage tanks and existing accessories.
 - 3. Installation of new instrumentation and all required accessories to measure storage tank level, including the installation and routing of all exposed, buried, and embedded conduits and associated wiring.
 - 4. Installation of new control panels
 - 5. Modifications of existing CH-CHEM 1 control panel at Crosstown and SCADA Panel at South Fayette PLC program.
 - 6. Install, power, and integrate with the FCWS SCADA the new level transmitters
 - 7. Cleaning, painting, and refurbishment of existing MCC in Chemical Building at Crosstown WTP

- B. Contracting Method: The Project shall be constructed using the design -bid-build method. The Contractor is to follow all requirements and specifications and drawings listed in this package, FCWS – Alum System Upgrade.
- C. Hazardous Environmental Conditions:
 - 1. To the best of Owner’s knowledge, no hazardous conditions exist at the sites.

1.3 WORK BY OTHERS

- A. Non-Professional Services Contracted by OWNER: OWNER will retain services of the following entities to perform the services indicated relative to the Project. CONTRACTOR shall coordinate and schedule the Work with, and cooperate with, the entities performing the following services for OWNER.
 - 1. None

1.4 WORK BY OWNER

- A. OWNER will perform the following in connection with the Work:
 - 1. Operate all existing valves, gates, pumps, equipment, and appurtenances that will affect OWNER’s operation, unless otherwise specified or indicated.
 - 2. Occupy both sites and buildings continuously to maintain operation of water treatment facilities.

1.5 SEQUENCE AND PROGRESS OF WORK

Requirements for sequencing and coordinating with OWNER’s operations, including maintenance of facility operations during construction, and requirements for tie-ins and shutdowns.

1.6 CONTRACTOR'S USE OF SITE

- C. Limits on contractor’s use of the site are:
 - 1. Do not use the site for operations other than those required for the project.

1.7 SALVAGE OF MATERIALS AND EQUIPMENT

- A. Existing materials and equipment removed and not shown or specified to be reused in the Work will become CONTRACTOR’s property, except the following items that shall remain OWNER’s property: None
- B. Existing materials and equipment removed by CONTRACTOR shall not be reused in the Work, except for the following: None
- C. Removal, Storage, Handling, Reinstallation:

1. Carefully remove in manner to prevent damage all materials and equipment shown or indicated to be salvaged and reused or to remain property of OWNER.
2. Store and protect salvaged items shown or indicated.
3. Replace in-kind or with new items those items of materials and equipment damaged during removal, storage, or handling through CONTRACTOR's actions, negligence, or improper procedures.

1.10 PARTIAL UTILIZATION BY OWNER

- A. Prior to Substantial Completion of the entire Work under the Contract, whenever, in the opinion of the Engineer, any section or portion of the Work or any structure is in suitable condition, it may be put into use upon the written order of the Engineer and such usage will not be held in any way as an acceptance of said Work or structure, or any part thereof, or as a waiver of any of the provisions of these Specifications and the Contract. Pending final completion and acceptance of the Work, all necessary repairs and replacements, due to defective materials or workmanship or operations of the Contractor, for any section of the Work so put into use shall be performed by the Contractor at Contractor's own expense.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

++ END OF SECTION ++

SECTION 01 13 13

MILESTONES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section describes Work to be substantially completed to comply with Milestones indicated in the Agreement. This Section is not intended to describe all the Work, or its constraints, interrelationships, or sequential requirements required.
2. CONTRACTOR shall provide all labor, materials, equipment, tools, and incidentals required to perform the Work in accordance with the Contract Times provisions of the Contract Documents.
3. To achieve each Milestone indicated in this Section, substantially complete those elements of the Work indicated starting with Article 0 of this Section, together with related equipment, systems, and appurtenant Work and activities.
4. Comply with the General Conditions, as may be modified by the Supplementary Conditions, regarding partial utilization and property insurance.

1.2 MILESTONE REQUIREMENTS

- A. Complete the following activities by the indicated date or days after the Notice to Proceed:

Milestones

Milestone	Consecutive Calendar Days after Notice to Proceed	Liquidated Damages Per Calendar Day
Substantial Completion of All Work	273	\$100
Final Completion of All Work	303	\$500

- B. Substantial completion for the purposes of assessing liquidated damages shall be defined as the time at which the work (or a specified part thereof) is complete in the opinion of engineer.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

+ + END OF SECTION + +

TABLE 01 14 16-A SCHEDULE OF TIE-INS					
Tie-In No.	New Line Size and Service	Existing (Connecting) Line Size & Service	Tie-In Building/Location	Construction Phase	Remarks
1					

TABLE 01 14 16-B SCHEDULE OF SHUTDOWNS				
Shut-down No.	Process Equipment and Service Lines Out-of-Service During Shutdown	Process Equipment In Operation During Shutdown	Tie-In Nos.	Maximum Duration
1				

SECTION 01 14 16

COORDINATION WITH OWNER'S OPERATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes requirements for coordinating with OWNER's operations during the Project and includes requirements for tie-ins and shutdowns necessary to complete the Work without impact on OWNER's operations except as allowed in this Section.
2. CONTRACTOR shall provide all labor, materials, equipment, tools, and incidentals shown, specified, and required to coordinate with OWNER's operations during the Work in accordance with this Section.

B. Coordination:

1. Review construction procedures under other Specifications sections and coordinate Work that will be performed with or before the Work specified in this Section.

C. Related Sections:

1. Section 01 11 13, Summary of Work.
2. Section 01 73 29, Cutting and Patching.

D. Except for shutdowns specified in this Section, perform the Work such that OWNER's facilities remain in continuous satisfactory operation during the Project. Schedule and conduct the Work such that the Work does not: impede OWNER's production or processes, create potential hazards to operating equipment and personnel, reduce the quality of the facility's products or effluent, cause odors or other nuisances, or affect the public health, safety, and convenience.

E. Work not specifically covered in this Section or in referenced Sections may, in general, be completed, within the Contract Times, at any time during regular working hours in accordance with the Contract Documents, subject to the requirements in this Section.

F. As a substitute to the procedures specified in this Section, CONTRACTOR may propose providing additional temporary facilities that can eliminate or mitigate a constraint without additional cost to OWNER, provided such additional temporary facilities: do not present hazards to the public, personnel, structures, and equipment; that such additional temporary facilities do not adversely affect OWNER's ability to comply with Laws and Regulations, permits, and operating requirements;

that such temporary facilities do not generate or foster the generation of odors and other nuisances; and that requirements of the Contract Documents are fulfilled.

- G. Coordinate shutdowns with OWNER and ENGINEER. When possible, combine multiple tie-ins into a single shutdown to reduce impacts on OWNER's operations and processes.
- H. Operation of Existing Systems and Equipment during the Work:
 - 1. Do not shut off or disconnect existing operating systems or equipment, unless accepted by ENGINEER in writing.
 - 2. Operation of existing systems and equipment will be by OWNER unless otherwise specified or indicated.
 - 3. Where necessary for the Work, CONTRACTOR shall seal or bulkhead OWNER-operated gates and valves to prevent leakage that may affect the Work, OWNER's operations, or both.
 - 4. Provide temporary watertight plugs, bulkheads, and line stops as required. After completing the Work, remove seals, plugs, bulkhead, and line stops to satisfaction of ENGINEER.

1.2 SUBMITTALS

- A. Action Submittals: Submit the following:
 - 1. Sequence Submittal: Furnish in detail the proposed sequence or procedures and associated effects, including evidence that OWNER's operations will not be adversely affected, to an extent greater than originally contemplated in the Contract Documents. List benefits including benefits to Progress Schedule. Submit in accordance with the requirements of the Contract Documents.
- B. Informational Submittals: Submit the following:
 - 1. Shutdown Planning Submittal:
 - a. For each shutdown, submit an inventory of labor, materials, and equipment required to perform the shutdown and tie-in tasks, an estimate of time required to accomplish the complete shutdown including time for OWNER to take down and start up existing equipment, systems, or conduits, and written description of steps required to complete the Work associated with the shutdown.
 - b. Furnish submittal to ENGINEER not less than 30 days prior to proposed shutdown start date. Do not start shutdown until obtaining ENGINEER's acceptance of shutdown planning submittal.

2. Shutdown Notification: After ENGINEER's acceptance of shutdown planning submittal and prior to starting the shutdown, submit written notification to OWNER and ENGINEER of date and time each shutdown is to start. Submit notification not less than 72 hours in advance of each shutdown.

1.3 GENERAL CONSTRAINTS

- A. Indicated in the Contract Documents are the sequence and shutdown durations, where applicable, for OWNER'S equipment, systems, and conduits (including piping and ducting) that are to be taken out of service temporarily for the Work. New materials, equipment, and systems may be used by OWNER after the specified field quality controls and testing are successfully completed and the materials or equipment are Substantially Complete in accordance with the Contract Documents.
- B. The following constraints apply to coordination with OWNER's operations:
 1. Schedule and perform equipment and system start-ups for Monday through Thursday. Equipment and systems shall not be placed into operation on Friday, Saturday, and Sunday without prior approval of OWNER, unless specifically indicated otherwise in the Contract Documents.
 2. Dead End Valves or Conduits: Provide blind flanges, watertight bulkheads, or valve at temporary and permanent terminuses of conduits, including piping and ducting. Blind flanges and bulkheads shall be suitable for the service and braced and blocked, as required, or otherwise restrained as directed by ENGINEER. Temporary valves shall be suitable for their associated service. Where valve is provided at permanent terminus of conduit, including piping or ducting, also provide on downstream side of valve a blind flange with drain/flushing connection.
 3. CONTRACTOR is responsible for dewatering process tanks, basins, conduits, and other work areas to be dewatered for shutdowns. Maintain clean and dry work area by pumping and properly disposing of fluid and other material that accumulates in work areas.
 4. Draining and Cleaning of Conduits, Tanks, and Basins:
 - a. Unless otherwise shown or indicated, CONTRACTOR shall dewater process tanks, basins, conduits (including piping) at beginning of each shutdown. Flush, wash down, and clean tanks, basins, conduits (including piping), and other work areas.

- b. CONTRACTOR shall remove liquids and solids and dispose of them at appropriate location at the Site as directed by OWNER. Unless otherwise specified or indicated, contents of tanks, basins, and conduits (including piping) undergoing modifications shall be transferred to existing process tanks or conduits at the Site with capacity sufficient to accept such discharges, using hoses, temporary piping, temporary pumps, or other means provided by CONTRACTOR. Discharge of fluids across floors is not allowed.
- c. If drainage point is not available on the conduit (including piping) to be drained, provide a wet tap using tapping saddle and valve or other method approved by ENGINEER. Uncontrolled spillage of contents of conduits (including piping) is not allowed.
- d. Spillage shall be brought to ENGINEER's attention immediately, both verbally and in writing, and reported in accordance with Laws and Regulations. CONTRACTOR shall wash down spillage to floor drains or sumps or other appropriate location and flush the system to prevent clogging and odors. If spillage is not suitable for discharge to the drainage system, such as chemical spills, as determined by ENGINEER, CONTRACTOR shall remove spillage by other method, such as vacuum truck, sorbents, or other method acceptable to ENGINEER.

1.4 RECOMMENDED SEQUENCE OF WORK

- A. Recommended Sequence of the Work is indicated. Certain phases or stages of the Work may require working 24-hour days or work during hours outside of regular working hours. Work may be accelerated from a later stage to an earlier stage if OWNER's operations are not adversely affected by proposed sequence change, with ENGINEER's acceptance. Stages specified in this Article 0 are sequence-dependent.
- B. Phase 1: The recommended Summary of Work in Phase 1 includes:
 - 1. Demolition Activities:
 - a. Removal of existing level monitors from all tanks in scope
- C. Phase 2: The recommended Summary of Work in Phase 2 includes:
 - 1. Installation of new ultrasonic level sensor
 - 2. Installation of electrical conductors, conduit, and control panels
- D. Phase 3: The recommended Summary of Work in Phase 3 includes:
 - 1. Electrical/I&C Installation

- a. Portions of electrical/I&C work may be performed in previous phases, as appropriate
2. Remainder of work including painting of MCC.

1.5 TIE-INS

- A. Table 01 14 16-A in this Section lists connections by CONTRACTOR to existing facilities. Table 01 14 16-A may not include all tie-ins required for the Work; CONTRACTOR shall perform tie-ins required to complete the Work as shown or indicated regardless of whether tie-in is indicated in Table 01 14 16-A. For tie-ins not indicated in Table 01 14 16-A, obtain requirements for tie-ins from ENGINEER by requesting an interpretation or clarification.

1.6 SHUTDOWNS

- A. General:
 1. Terminology: A "shutdown" is when a portion of the normal operation of OWNER's facility, whether equipment, systems, conduit (including piping and ducting), has to be temporarily suspended or taken out of service to perform the Work.
 2. Work that may interrupt normal operations shall be accomplished at times convenient to OWNER unless otherwise indicated in the Contract Documents.
 3. Furnish at the Site, in close proximity to the shutdown and tie-in work areas, tools, materials, equipment, spare parts, both temporary and permanent, necessary to successfully perform the shutdown. Complete to the extent possible, prefabrication of piping and other assemblies prior to commencing the associated shutdown. Demonstrate to ENGINEER's satisfaction that CONTRACTOR has complied with such requirements before commencing the shutdown.
 4. If CONTRACTOR's operations cause an unscheduled interruption of OWNER's operations, immediately re-establish satisfactory operation for OWNER.
 5. Unscheduled shutdowns or interruptions of continued safe and satisfactory operation of OWNER's facilities that result in fines or penalties by authorities having jurisdiction shall be paid solely by CONTRACTOR if, in ENGINEER's opinion, CONTRACTOR did not comply with requirements of the Contract Documents, or was negligent in the Work, or did not exercise proper precautions in performing the Work and complying with applicable permits, Laws, and Regulations.

6. Shutdowns shall be in accordance with Table 01 14 16-B of this Section. Work requiring service interruptions for tie-ins shall be performed during scheduled shutdowns.
 7. Temporary, short-term shutdowns of smaller conduits (including piping and ducting), equipment, and systems may not be included in Table 01 14 16-B. Coordinate requirements for such shutdowns with ENGINEER and OWNER. Where necessary, obtain ENGINEER's interpretation or clarification before proceeding.
- B. Shutdowns of Electrical Systems:
1. Comply with Laws and Regulations, including the National Electric Code.
 2. CONTRACTOR shall lock out and tag circuit breakers and switches operated by OWNER and shall verify that affected cables and wires are de-energized to ground potential before shutdown Work is started.
 3. Upon completion of shutdown Work, remove the locks and tags and notify ENGINEER that facilities are available for use.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL

- A. In addition to requirements of this section, comply with section 01 73 29, cutting and patching and other contract documents applicable to work associated with shutdowns, tie-ins, temporary pumping (where applicable), and similar work.

3.2 SHUTDOWN REQUIREMENTS

- A. General:
1. Shutdown shall be coordinated with FCWS at least 14 days in advance of the shutdown.
 2. Shutdown shall be limited to a maximum of 8 hours.
- B. Prior to Shutdown:
1. Obtain ENGINEER's acceptance of proposed shutdown planning submittal and shutdown notification submittal.
 2. Bring necessary piping, couplings, valves, equipment, and appurtenances to the work areas.
 3. Assist OWNER in preparing to take distribution main temporarily out of service.

- C. During Shutdown:
 - 1. Perform required work to connect to distribution main.
- D. Following Shutdown:
 - 1. Verify functionality of equipment and systems.
 - 2. Verify operation of new equipment and systems and verify that joints in conduits (including piping and ducting) are watertight or gastight as applicable.
 - 3. Repair joints that are not watertight or gastight, as applicable.

3.3 SCHEDULES

- A. The schedules indicated below, attached following this Section's "End of Section" designation, are part of this Specifications Section:
 - 1. Table 01 14 16-A, Schedule of Tie-ins.
 - 2. Table 01 14 16-B, Schedule of Shutdowns.

END OF SECTION 01 14 16

TABLE 01 14 16-A SCHEDULE OF TIE-INS					
Tie-In No.	New Line Size and Service	Existing (Connecting) Line Size & Service	Tie-In Building/Location	Construction Phase	Remarks
1					

TABLE 01 14 16-B SCHEDULE OF SHUTDOWNS				
Shut- down No.	Process Equipment and Service Lines Out-of-Service During Shutdown	Process Equipment In Operation During Shutdown	Tie-In Nos.	Maximum Duration
1				

SECTION 01 22 13

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Items listed starting in Article 1.4 of this Section refer to and are the same pay items listed in the Bid Form and constitute all pay items for completing the Work.
2. No direct or separate payment will be made for providing miscellaneous temporary or accessory works, plant or facility services, CONTRACTOR's or ENGINEER's field offices, layout surveys, Project signs, sanitary requirements, testing, safety provisions and safety devices, submittals and record drawings, water supplies, power and fuel, maintenance of traffic, removal of waste, security, coordination with OWNER's operations, information technology (including hardware, software, and services) required during construction, commissioning where specified, bonds, insurance, or other requirements of the General Conditions, Supplementary Conditions, Division 01 Specifications, and other requirements of the Contract Documents.
3. Compensation for all services, items, materials, and equipment shall be included in prices stipulated for lump sum and unit price pay items listed in this Section and included in the Contract.

B. Each lump sum and unit price, as bid, shall include an amount considered by contractor to be adequate to cover contractor's overhead and profit for each separately identified item.

C. Bid prices included on the bid form shall be full compensation for all materials, labor, equipment, tools, construction equipment and machinery, heat, utilities, transportation, taxes, overhead, markup, incidentals and services necessary for the execution and completion of the work in the contract documents to be performed under this contract. For the work described, the allowance and unit price, actual used and installed quantities of each bid item shall be measured in the field and certified by the engineer and/or owner upon completion of construction in the manner set forth for each item in this and other sections of the specifications.

Payment for all items listed on the bid form will constitute full compensation for all work shown and specified to be performed.

1.2 ENGINEER'S ESTIMATE OF QUANTITIES

- A. ENGINEER's estimated quantities for items of Unit Price Work, as included in the Contract, are approximate only and are included solely for purpose of comparing Bids and pricing. OWNER does not expressly or by implication agree that nature of materials encountered below the ground surface or actual quantities of material encountered or required will correspond with the quantities included in the Contract at the time of award and reserves the right to increase or decrease quantities, and to eliminate quantities, as OWNER may deem necessary.
- B. CONTRACTOR and OWNER will not be entitled to adjustment in unit prices as a result of change in estimated quantity and agree to accept the unit prices accepted in the Bid as complete and total compensation for additions or deletions caused by changes or alterations in the Unit Price Work directed by OWNER.

1.3 RELATED PROVISIONS

- A. Payments to contractor: refer to general conditions, supplementary conditions, agreement, and section 01 29 76, progress payment procedures.
- B. Changes in contract price: refer to general conditions, supplementary conditions, and section 01 26 00, contract modification procedures.
- C. Schedule of values: refer to general conditions, supplementary conditions, and section 01 29 73, schedule of values.

1.4 BID ITEMS

- A. Lump sum payment will be full compensation for completing the work, as shown or indicated under division 01 through division 46, including owner/engineer directed work items.
- B. The following Item No. 1.1 through 1.2 comprise the Base Bid Total as listed on the Bid Form .
 - 1. Item No. 1.1 – Mobilization/Demobilization (5% Maximum of Total Bid)
 - a. Description: Preconstruction costs of preparatory work and operations and removal of equipment and surplus materials from the project site. Includes premiums for bonds and insurance, preconstruction photos, mobilizing and demobilizing equipment and materials to and from the project site, as-built records.

- b. Unit of Measurement: Lump Sum where total amount bid shall be no greater than five (5) percent of the sum of all other bid items of all schedules.
- 2. Item No. 1.2
 - a. Crosstown WTP Improvements
 - b. South Fayette WTP Improvements

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 22 13

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Scope: Section includes:
 - 1. Administrative and procedural requirements for selecting materials and equipment for the Project.
 - 2. Procedural requirements for substitutions of materials and equipment.
 - 3. Procedural requirements for substitute construction methods or procedures when construction methods or procedures are specified.
- B. A proposed substitute will not be accepted for review if:
 - 1. Approval would require changes in design concept or a substantial revision of the Contract Documents.
 - 2. Approval would delay completion of the Work or the work of other contractors.
 - 3. Substitution request is indicated or implied on a Shop Drawing or other submittal, or on a request for interpretation or clarification, and is not accompanied by CONTRACTOR's formal and complete request for substitution.
- C. If proposed substitute is not approved, CONTRACTOR shall provide the specified materials, equipment, method, or procedure, as applicable.
- D. Approval of a substitute does not relieve CONTRACTOR from requirement for submitting Shop Drawings and other submittals in accordance with the Contract Documents.
- E. ENGINEER and OWNER have the right to rely upon the completeness and accuracy of the information included in CONTRACTOR's request for approval of a substitute, and CONTRACTOR accepts full responsibility for the completeness and accuracy thereof.
- F. When approved substitute is defective or fail to perform in accordance with the Contract Documents, responsibility for remedying the defect or failure resides solely with CONTRACTOR and Supplier.

1.2 SUBSTITUTE MATERIALS AND EQUIPMENT

- A. Requests for approval of substitute items of materials or equipment will be considered within a period of 30 days after the Effective Date of the Contract. After the end of specified period, substitution requests will be

considered only in case of unavailability of a specified item of material or equipment or other conditions beyond CONTRACTOR's control.

B. Procedure:

1. Submit requests for substitution in accordance with requirements for furnishing submittals, as indicated in Section 01 33 00, Submittal Procedures.
2. Submit separate request for each proposed substitute.
3. Submit request for substitution using forms attached to this Section. Complete all information requested on each form and enclose with the forms supplementary information as required. In addition to requirements of the General Conditions and information required on substitution request forms, include with each substitute request the following:
 - a. Identification of the materials and equipment (as applicable), including manufacturer's name and address.
 - b. Manufacturer's literature with description of the materials and equipment, performance and test data, and reference standards with which materials and equipment comply.
 - c. Samples, when appropriate.
 - d. Name and address of similar projects on which the materials and equipment were used, date of installation, and names and contact information (including telephone number) for the facility operations and maintenance manager.

1.3 SUBSTITUTE CONSTRUCTION METHODS OR PROCEDURES

- A. Where construction methods or procedures are specified, for a period of 30 days after the Effective Date of the Contract, ENGINEER will consider CONTRACTOR's written requests for substitute construction methods or procedures shown or specified in the Contract Documents.
- B. The provisions of the General Conditions, as may be modified by the Supplementary Conditions, regarding substitute items of materials and equipment are hereby extended to apply to substitute construction methods or procedures.
- C. Procedure:
 1. Submit requests for substitution in accordance with requirements for furnishing submittals, as indicated in Section 01 33 00, Submittal Procedures.
 2. Submit separate request for each proposed substitute.
 3. Submit request for substitution using forms attached to this Section. Complete all information requested on each form and

enclose with the forms supplementary information as required. In addition to requirements of the General Conditions and information required on substitution request forms, include with each substitute request the following:

- a. Detailed description of proposed method or procedure.
- b. Itemized comparison of the proposed substitution with the specified method or procedure.
- c. Drawings illustrating method or procedure.
- d. Other data required by ENGINEER to establish that proposed substitution is equivalent to specified method or procedure.

1.4 CONTRACTOR'S REPRESENTATIONS

- A. In submitting request for substitution, CONTRACTOR represents that:
 1. CONTRACTOR has read and fully understands the provisions regarding substitutes as indicated in the General Conditions, as may be modified by the Supplementary Conditions.
 2. Substitution request is complete and includes all information required by the Contract Documents.
 3. CONTRACTOR certifications required by the General Conditions, as may be modified by the Supplementary Conditions, are valid and made with CONTRACTOR's full knowledge, information, and belief.
 4. CONTRACTOR will provide the same or better guarantees or warranties for proposed substitute as for the specified materials, equipment, methods, or procedures, as applicable.
 5. CONTRACTOR waives all Claims for additional costs or extension of time related to proposed substitute that subsequently may become apparent.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The documents listed below and attached following this Section's "End of Section" designation, are part of this Specification Section.
 1. Substitution Request Form (two pages).
 2. Product Substitution Checklist (one page).

END OF SECTION 01 25 00

SUBSTITUTION REQUEST

Project: _____ Substitution Request Number: _____
 To: _____ Engineer Project Number: _____
 Re: _____ Date: _____
 _____ From: _____
 _____ Contract For: _____

Specification Title: _____ Description: _____
 Section _____ Page _____ Article/Paragraph: _____

Proposed Substitute: _____
 Manufacturer: _____ Address: _____ Phone: _____
 Trade Name: _____ Model No. _____
 Installer: _____ Address: _____ Phone: _____

History: ☐ New Product ☐ 1 to 4 years old ☐ 5 to 10 years old ☐ More than 10 years old

Differences between proposed substitute and specified item: _____

☐ Point-by-point comparative data attached — REQUIRED BY THE CONTRACT DOCUMENTS

Reason for not providing specified item: _____

Similar Installation:
 Project: _____ Engineer _____
 Address: _____ Owner: _____
 Date Installed: _____

Proposed substitution affects other parts of Work: ☐ No ☐ Yes Explain _____

Savings to Owner for accepting substitute: _____ (\$ _____)

(attach detailed, itemized estimate)

Proposed substitute changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] _____ days

(clarify whether change is to Substantial Completion, Milestone, or time for readiness for final payment)

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐

SUBSTITUTION REQUEST

(Continued)

- ☐ Substitute product, method, or procedure is subject to payment of licensing fee or royalty (check if "yes" and attach information)
- ☐ Substitute product, method, or procedure is patented or copyrighted (check if "yes" and attach information)

The undersigned certifies:

- Representations in the General Conditions and in Section 01 25 00, Substitution Procedures, regarding substitutions are valid.
- Same or better warranty and guarantee will be furnished for proposed substitution as for specified item.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitute will have no adverse effect on other trades and will not affect or delay Progress Schedule.
- Cost data as stated above is complete. Claims for additional costs or time related to accepted substitution which may subsequently become apparent are waived.
- Proposed substitute does not affect dimensions and functional clearances.
- Payment will be made for Engineer's review and changes, if any, to the design and Contract Documents, and construction costs caused by the substitute.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted By: _____

Signed By: _____

Firm: _____

Address: _____

Telephone: _____

Attachments: ☐

ENGINEER'S REVIEW AND ACCEPTANCE (OR NON-ACCEPTANCE) WILL BE DOCUMENTED IN A FIELD ORDER OR CHANGE ORDER, AS APPROPRIATE.

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ Engineer
☐ Other:

Adapted from CSI Form No. 13.0B, 2004 edition

PRODUCT SUBSTITUTION CHECKLIST

Date: _____ Re: _____
Engineer Project Number: _____ Manufacturer's Project Number: _____
Filing Number: _____ Contract For: _____

Itemized Equivalence:

- ☐ Is the submitted item equivalent to the specified item? _____
- ☐ Does it serve the same function? _____
- ☐ Does it have the same dimensions? _____
- ☐ Does it have the same appearance? _____
- ☐ Will it last as long? _____
- ☐ Does it comply with the same codes, and standards and performance requirements? _____
- ☐ Has the item been used locally, and where are the projects? _____
- ☐ Has a problem occurred with the item, and what was the remedy? _____

Effect of Project:

- ☐ Will the substitute affect other aspects of the construction? _____
- ☐ Are any details affected and are changes required? _____
- ☐ What is the cost of the changes? _____
- ☐ Who pays for the required changes? _____
- ☐ Are Contract Times affected? _____

Effect of Warranty:

- ☐ How does the proposed warranty differ from the specified warranty? _____
- ☐ Does the manufacturer have a track record of standing behind the warranty? _____

Adapted from CSI Form No. 20.3, 1998 edition

SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Scope.
 - 1. This Section expands upon provisions of the General Conditions, as may be modified by the Supplementary Conditions, and includes:
 - a. Requests for interpretation.
 - b. Written clarifications.
 - c. Minor changes in the Work and Field Orders.
 - d. Work Change Directives.
 - e. Proposal Requests.
 - f. Change Proposals.
 - g. Change Orders.
- B. Submit Contract modification documents to ENGINEER, addressed to the contact person and contact information indicated in Section 01 33 00, Submittal Procedures, and in accordance with Section 01 31 26, Electronic Communication Protocols.
- C. Retain at CONTRACTOR's office and at the Site complete copy of each Contract modification document and related documents, and ENGINEER's response.

1.2 REQUESTS FOR INTERPRETATION

- A. General.
 - 1. Transmit written requests for interpretation to ENGINEER. CONTRACTOR and OWNER may prepare and transmit requests for interpretation.
 - 2. Prepare and transmit request for interpretation to obtain clarifications or interpretations of the Contract Documents. Report conflicts, errors, ambiguities, and discrepancies in the Contract Documents by requesting an interpretation.
 - 3. Do not transmit request for interpretation when other form of communication is appropriate, such as CONTRACTOR's submittals, requests for approvals of substitutes, notices, ordinary correspondence, or other form of communication. Improperly

prepared or inappropriate requests for interpretation will be returned without response or action by ENGINEER.

4. Do not submit request for interpretation or clarification when:
 - a. answer may be obtained by observations at the Site; or
 - b. required information is clearly indicated in the Contract Documents; or
 - c. required information is included in industry standards referenced in the Contract Documents or Supplier's instructions that are consistent with the Contract Documents; or
 - d. are reasonably inferable from any of foregoing.
5. CONTRACTOR shall have sole financial responsibility for requests for interpretations or clarifications that are submitted late, out of sequence, or that are unnecessary.

B. Procedure.

1. Transmit requests for interpretation in accordance with Section 01 31 26, Electronic Communication Protocols, and requirements of this Section. Include with each request for interpretation a separate letter of transmittal.
2. ENGINEER will provide timely review of requests for interpretation. Allow sufficient time for review and response.
3. ENGINEER will maintain log of requests for interpretation. Upon request, copy of log will be transmitted to requestor.
4. ENGINEER's response to requests for interpretation will be transmitted in accordance with Section 01 31 26, Electronic Communication Protocols, and requirements of this Section. Each response to a request for interpretation will include a separate letter of transmittal.
5. ENGINEER's written response to each request for interpretation will be distributed to:
 - a. CONTRACTOR.
 - b. OWNER.
 - c. Resident Project Representative (RPR).
 - d. ENGINEER.
6. If ENGINEER requests additional information to make an interpretation, entity requesting the interpretation shall transmit the information requested within ten days, unless ENGINEER allows additional time, via correspondence referring to request for interpretation number.

7. Interpretations that One or Both Parties Believes Entails a Change to the Contract:
 - a. If CONTRACTOR or OWNER believes that a change in the Contract Price or Contract Times or other change to the Contract is required as a result of ENGINEER's interpretation, so advise ENGINEER in writing before proceeding with the Work associated with the request for interpretation.
 - b. If, after this initial communication, either OWNER or CONTRACTOR believes that change in Contract Price, Contract Times, both, or other relief with respect to the terms of the Contract is necessary, recourse shall be in accordance with the Contract Documents.

C. Preparation of Requests for Interpretation:

1. Prepare each request for interpretation on the "Request for Interpretation" form included with this Section, or other form acceptable to ENGINEER.
2. Number each request for interpretation as follows: Numbering system shall be the Contract number and designation followed by a hyphen and three-digit sequential number. Example: First request for interpretation on the general contract for project titled, "Contract A15" would be, "RFI No. A15-GC-001".
3. In space provided on form, describe the interpretation requested. Provide additional sheets as necessary. Include text and sketches as required in sufficient detail to describe the need for an interpretation.
4. When applicable, request for interpretation shall include CONTRACTOR's recommended resolution.

1.3 WRITTEN CLARIFICATIONS

A. General:

1. Written clarifications, when required, will be initiated and issued by ENGINEER.
2. Written clarifications do not change the Contract Price or Contract Times, and do not alter the Contract Documents.
3. Written clarifications will be issued as correspondence or using clarification notice form, with additional information as required.

B. Procedure.

1. ENGINEER's written clarifications will be transmitted in accordance with Section 01 31 26, Electronic Communication Protocols, and requirements of this Section.

2. Each written clarification will be distributed to:
 - a. CONTRACTOR.
 - b. OWNER.
 - c. Resident Project Representative (RPR).
 - d. ENGINEER.
3. Written Clarifications that One or Both Parties Believes Entails a Change to the Contract:
 - a. If CONTRACTOR or OWNER believes that a change in the Contract Price or Contract Times or other change to the Contract is required as a result of ENGINEER's written clarification, so advise ENGINEER in writing before proceeding with the Work associated with the written clarification.
 - b. If, after this initial communication, either OWNER or CONTRACTOR believes that change in Contract Price, Contract Times, both, or other relief with respect to the terms of the Contract is necessary, recourse shall be in accordance with the Contract Documents.
4. If ENGINEER's written clarification is unclear, prepare and transmit a request for interpretation.

1.4 MINOR CHANGES IN THE WORK AND FIELD ORDERS

A. General:

1. Field Orders, when required, will be initiated and issued by ENGINEER.
2. Field Orders authorize minor variations in the Work but do not change the Contract Price or Contract Times.
3. Field Orders will be in the form of Engineers Joint Contract Documents Committee document EJCDC® C-942, "Field Order".
4. ENGINEER will maintain a log of Field Orders issued.

B. Procedure.

1. Field Orders will be transmitted in accordance with Section 01 31 26, Electronic Communication Protocols, and requirements of this Section. Each Field Order will include a separate letter of transmittal.
2. Each Field Order will be distributed to:
 - a. CONTRACTOR.
 - b. OWNER.

- c. Resident Project Representative (RPR).
 - d. ENGINEER.
3. Field Orders that One or Both Parties Believes Entails a Change to the Contract Price or Contract Times:
 - a. If CONTRACTOR or OWNER believes that a change in the Contract Price or Contract Times or other change to the Contract is required as a result of a Field Order, so advise ENGINEER in writing before proceeding with the Work associated with the Field Order.
 - b. If, after this initial communication, CONTRACTOR believes that change in Contract Price, Contract Times, both, or other relief with respect to the terms of the Contract is necessary, recourse shall be in accordance with the Contract Documents.
4. If the Field Order is unclear, submit request for interpretation.

1.5 WORK CHANGE DIRECTIVES

A. General:

1. Work Change Directives, when required, order additions, deletions, or revisions to the Work.
2. Work Change Directives do not change the Contract Price or Contract Times but are evidence that the parties to the Contract expect that the change ordered or documented by the Work Change Directive will be incorporated in subsequently issued Change Order following agreement by the parties as to the Work Change Directive's effect, if any, on the Contract Price or Contract Times..
3. Work Change Directives will be in the form of EJCDC® C-940, "Work Change Directive".

B. Procedure.

1. Work Change Directives signed by OWNER and ENGINEER will be transmitted in accordance with Section 01 31 26, Electronic Communication Protocols, and requirements of this Section. Each Work Change Directive will include a separate letter of transmittal. CONTRACTOR shall print three originals of Work Change Directive for CONTRACTOR's signature.
2. CONTRACTOR shall promptly sign each original Work Change Directive and, within five days of receipt, return all originals to ENGINEER.
3. Original, signed Work Change Directives will be distributed as follows:

- a. CONTRACTOR: One original.
 - b. OWNER: One original.
 - c. ENGINEER: One original.
4. One copy of each Work Change Directive will be distributed to:
 - a. Resident Project Representative (RPR).
5. Documentation of Costs:
 - a. When basis of payment for Work ordered under a Work Change Directive will be paid as Cost of the Work, or when otherwise required by ENGINEER, document for the Work performed under each separate Work Change Directive, for each day, the following:
 - 1) Number and labor classifications of workers employed and hours worked.
 - 2) Construction equipment used including manufacturer, model, and year of manufacture, and number of hours such equipment was onsite and used for the Work under the Work Change Directive.
 - 3) Consumables and similar materials used.
 - 4) Receipts, bills, or invoices for and descriptions of materials and equipment incorporated into the Work.
 - 5) Invoices and labor and equipment breakdowns for Subcontractors and Suppliers.
 - 6) Other information required by OWNER or ENGINEER,
 - b. Submit such information in a format acceptable to ENGINEER.
 - c. Transmit such documentation to ENGINEER as a Change Proposal.

1.6 PROPOSAL REQUESTS

A. General:

1. Proposal Requests may be initiated by ENGINEER or OWNER.
2. Proposal Requests are for requesting the effect on the Contract Price and the Contract Times and other information relative to contemplated changes in the Work. Proposal Requests do not authorize changes or variations in the Work, and do not change the Contract Price or Contract Times or terms of the Contract.

3. Proposal Requests will be furnished using the "Proposal Request" form included with this Section.

B. Procedure.

1. Proposal Requests will be transmitted in accordance with Section 01 31 26, Electronic Communication Protocols, and requirements of this Section. Each Proposal Requests will include a separate letter of transmittal.
2. Each signed Proposal Request will be transmitted to:
 - a. CONTRACTOR.
 - b. OWNER.
 - c. Resident Project Representative (RPR).
 - d. ENGINEER.
3. Transmit request for interpretation to clarify conflicts, errors, ambiguities, and discrepancies in Proposal Request.
4. Upon receipt of Proposal Request, CONTRACTOR shall prepare and transmit to ENGINEER a Change Proposal, in accordance with the Contract Documents, for the proposed Work described in the Proposal Request.

1.7 CHANGE PROPOSALS

A. General.

1. Prepare and transmit written Change Proposal to ENGINEER in response to each Proposal Request; or when CONTRACTOR believes a change in the Contract Price or Contract Times or other change to the terms of the Contract is required; or to appeal an initial decision by ENGINEER concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under the Contract.

B. Procedure.

1. Prepare and transmit Change Proposals within time limits indicated in the General Conditions, as may be modified by the Supplementary Conditions.
2. Transmit Change Proposals in accordance with Section 01 31 26, Electronic Communication Protocols, and requirements of this Section. Include with each Change Proposal all required supporting documentation and a separate letter of transmittal.
3. ENGINEER's Review and Requests for Additional Information:

- a. ENGINEER will review and act on each Change Proposal in accordance with, and within the time limits indicated in, the General Conditions, as may be modified by the Supplementary Conditions.
 - b. When, ENGINEER requests additional information to render a decision, submit required information within five days of receipt of ENGINEER's request, unless ENGINEER allows more time. Submit the required information via correspondence that refers to the specific Change Proposal number.
 - c. OWNER shall transmit to ENGINEER such comments, if any, that OWNER has on the Change Proposal, within 10 days of OWNER's receipt of the Change Proposal.
 - d. ENGINEER will render a written decision on the Change Proposal.
 - e. ENGINEER's response to Change Proposals will be transmitted in accordance with Section 01 31 26, Electronic Communication Protocols, and requirements of this Section, the General Conditions, and the Supplementary Conditions.
 4. ENGINEER's response to each Change Proposal will be distributed to:
 - a. CONTRACTOR.
 - b. OWNER.
 - c. Resident Project Representative (RPR).
 - d. ENGINEER.
 5. If Change Proposal is recommended for approval by ENGINEER and is approved by OWNER, a Change Order will be issued or, when applicable, an appropriate use of contingency allowance will be authorized by OWNER.
 6. If parties do not agree on terms for the change, OWNER or CONTRACTOR may file a Claim against the other, in accordance with the General Conditions, as may be modified by the Supplementary Conditions.
- C. Preparation of Change Proposals:
1. Each Change Proposal shall be submitted on the "Change Proposal" form included with this Section, or other form acceptable to ENGINEER.
 2. Number each Change Proposal as follows: Numbering system shall be the Contract number and designation followed by a hyphen and three-digit sequential number. Example: First Change Proposal for

the general contract for project named “Contract A15” would be, “Change Proposal No. A15-GC-001”.

3. In space provided on Change Proposal form:
 - a. Describe scope of each proposed change. Include text and sketches on additional sheets as required to provide detail sufficient for ENGINEER’s review and response. If a change item is submitted in response to Proposal Request, write in as scope, “In accordance with Proposal Request No.” followed by the Proposal Request number. Submit written clarifications, if any, to scope of change.
 - b. Submit justification for each proposed change. If change is in response to proposal request, write in as justification, “In accordance with Proposal Request No.” followed by the proposal request number.
 - c. List the total change in the Contract Price and Contract Times for each separate change item included in the Change Proposal.
4. Unless otherwise directed by ENGINEER, attach to the Change Proposal detailed breakdowns of pricing (Cost of the Work and CONTRACTOR’s fee) including:
 - a. List of Work tasks to accomplish the change.
 - b. For each task, labor cost breakdown including labor classification, total hours per labor classification, and hourly cost rate for each labor classification.
 - b. Construction equipment and machinery to be used, including manufacturer, model, and year of manufacture, and number of hours for each.
 - c. Detailed breakdown of cost of materials and equipment to be incorporated into the Work, including quantities, unit costs, and total cost, with Supplier’s written quotations.
 - d. Breakdowns of the Cost of the Work and fee for Subcontractors, including labor, construction equipment and machinery, and materials and equipment incorporated into the Work, other costs, and Subcontractor fees (e.g., overhead and profit).
 - e. Breakdown of other costs eligible, in accordance with the General Conditions and the Supplementary Conditions under “Cost of the Work” provisions.
 - f. Other information required by ENGINEER.

- g. CONTRACTOR's fees applied to eligible CONTRACTOR costs and eligible Subcontractor costs.

1.8 CHANGE ORDERS

A. General:

1. Change Orders will be recommended by ENGINEER (when required by the General Conditions), and will be signed by OWNER and CONTRACTOR, to authorize additions, deletions, or revisions to the Work, or changes to the Contract Price or Contract Times.
2. Change Orders will be in the form of EJCDC® C-941, "Change Order".

B. Procedure.

1. Change Orders for signature by CONTRACTOR will be transmitted in accordance with Section 01 31 26, Electronic Communication Protocols, and requirements of this Section. Each Change Order will include a separate letter of transmittal. CONTRACTOR shall print three originals of Change Order for CONTRACTOR's signature.
2. CONTRACTOR shall promptly sign each original Change Order and, within five days of receipt, return all originals to ENGINEER.
3. ENGINEER will sign each original Change Order and forward them to OWNER.
4. After approval and signature by OWNER, original Change Orders will be distributed as indicated below.
5. Original, signed Change Orders will be distributed as follows:
 - a. CONTRACTOR: One original.
 - b. OWNER: One original.
 - c. ENGINEER: One original.
6. One copy of each Change Order will be distributed to:
 - a. Resident Project Representative (RPR).

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 ATTACHMENTS

Contract Modification Procedures

- A. The forms listed below, following this Section's "End of Section" designation, are part of this Specifications Section:
1. Request for Interpretation form (one page).
 2. Proposal Request form (one page).
 3. Change Proposal form (one page).

END OF SECTION 01 26 00

REQUEST FOR INTERPRETATION

Owner: _____

Project _____

Name: _____

Contractor: _____ RFI No. _____

Date Transmitted: _____ Date Received: _____

Date Response Requested: _____ Date Response Transmitted: _____

Subject: _____

Specification Section and Paragraph: _____

Drawing References: _____

INTERPRETATION REQUESTED:

Signature: _____

Date: _____

ENGINEER'S RESPONSE:

Signature: _____

Date:

PROPOSAL REQUEST

Owner:

Project

Name:

Proposal Request No.: _____ Date: _____

Contract Name and No.: _____

Contractor: _____

Other Contracts Involved in Proposed Change:

TO CONTRACTOR: Please submit a complete Change Proposal for the proposed modifications described below. If the associated Change Proposal is approved, a Change Order or allowance authorization will be issued to authorize adjustment so the scope of the Work. This Proposal Request is not a Change Order, Work Change Directive, Field Order, or an authorization to proceed with the proposed Work described below.

SCOPE OF PROPOSED WORK:

1. *Item:*
2. *Item:*
3. *Item:*

Proposal requested by: _____

Signature

of

Requestor:

CHANGE PROPOSAL

Owner:

Project

Name:

Change Proposal No.: _____ Date: _____

Submitted in Response to Proposal Request No.:

Contract Name and No.: _____

Contractor: _____

Subject:

The following changes to the Contract are proposed:

SCOPE OF WORK: *(attach and list supporting information as required)*

1. *Item:*
2. *Item:*

JUSTIFICATION:

1. *Item:*
2. *Item:*

CHANGES IN CONTRACT PRICE AND CONTRACT TIMES:

We propose that the Contract Price and Contract Times be changed as follows:

For Contract Price, attach detailed cost breakdowns for Contractor and Subcontractors, Supplier quotations, and other information required.

For the Contract Times, state increase, decrease, or no change to Contract Times for Substantial Completion, readiness for final payment, and Milestones, if any. If increase or decrease, state specific number of days for changes to the Contract Times.

Description	Amount	Contract Times (days)	
		Substantial	Final
1. Item	\$0.00	0	0

2. Item	\$0.00	0	0
Total This Change Proposal	\$0.00	0	0

Changes to Milestones, if any:

Contractor represents that supporting data attached to this Change Proposal are accurate and complete. The requested time or price adjustment indicated in this Change Proposal is the entire adjustment to which Contractor believes it is entitled as a result of the proposed change(s) indicated herein.

Change Proposal by: _____

Signature of Proposer:

SECTION 01 29 73

SCHEDULE OF VALUES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall prepare and submit to ENGINEER for acceptance a Schedule of Values that allocates cost to each item of the Work. Schedule of Value list of line items shall correspond to each aspect of the Work, establishing in detail the portion of the Contract Price allocated to each major component of the Work.
2. Upon request of ENGINEER, support values with data that substantiate their correctness.
3. Submit preliminary Schedule of Values to ENGINEER for initial review. CONTRACTOR shall incorporate ENGINEER's comments into the Schedule of Values and resubmit to ENGINEER. ENGINEER may require corrections and re-submittals until Schedule of Values is acceptable.
4. Schedule of Values may be used as a basis for negotiating price of changes, if any, in the Work.
5. Schedule of Values and the Progress Schedule updates specified in Section 01 32 16, Progress Schedule, will be basis for preparing and reviewing each Application for Payment.

1.2 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Submit to ENGINEER Schedule of Values in the form and quantity required in Section 01 33 00, Submittal Procedures, and in accordance with Section 01 31 26, Electronic Communication Protocols.
2. Content of Schedule of Values submittals shall be in accordance with Article 1.3 of this Section.
3. Timing of Submittals:
 - a. Submit preliminary Schedule of Values within time limit indicated in the General Conditions.
 - b. Submittal of the Schedule of Values for acceptance by ENGINEER shall be in accordance with the General

Conditions. ENGINEER will not accept Applications for Payment without an acceptable Schedule of Values.

- c. When required by ENGINEER, promptly submit updated Schedule of Values to include cost breakdowns for changes in the Contract Price.

1.3 SCHEDULE OF VALUES FORMAT AND CONTENT

A. Organization and Major Elements of Schedule of Values

1. Prepare Schedule of Values on the “progress estimate” or “continuation sheets”, as applicable, of the Application for Payment form indicated in Section 01 29 76, Progress Payment Procedures.
2. Organization in Accordance with Specification Sections:
 - a. Within each work area, organize the Schedule of Values by the various Specifications Section numbers and titles included in the Contract Documents.
 - b. Label each row in the Schedule of Values with the appropriate Specifications Section number. Include an amount for each row in the Schedule of Values.
 - c. List sub-items of major products or systems, as appropriate or when requested by ENGINEER.
3. Include in Schedule of Values unit price payment items with their associated quantity. Provide in the Schedule of Values detailed breakdown of unit prices when required by ENGINEER.

B. Requirements for preliminary Schedule of Values and Schedule of Values are:

1. Subcontracted Work:
 - a. Schedule of Values shall show division of Work between CONTRACTOR and Subcontractors.
 - b. Line items for Work to be done by Subcontractor shall include the word, “(SUBCONTRACTED)”.
2. Apportionment between Materials and Equipment, and Installation:
 - a. Schedule of Values shall include breakdown of costs for materials and equipment, installation, and other costs used in preparing the Bid by CONTRACTOR and each Subcontractor.
 - b. List purchase and delivery costs for materials and equipment for which CONTRACTOR may apply for payment as stored materials.

3. Sum of individual values shown on the Schedule of Values shall equal the total of associated payment item. Sum of payment item totals in the Schedule of Values shall equal the Contract Price.
4. Overhead and Profit: Include in each line item a directly proportional amount of CONTRACTOR's overhead and profit. Do not include overhead and profit as separate item(s).
5. Include separate line item for each allowance, and for each unit price item.
6. Bonds and Insurance Costs: Include line item for bonds and insurance in payment item for (TBD), in amount not exceeding 2.0 percent of the Contract Price. This amount may be applied for in the first Application for Payment.
7. Include relevant items for the General Conditions, permits (when applicable), construction Progress Schedule, and other items required by ENGINEER. Include such items in Applications for Payment-on-payment schedule acceptable to ENGINEER.
8. Line items for Site maintenance such as dust control, cleaning, , compliance with storm water pollution prevention plans and permits, spill prevention control and countermeasures plans, and for construction photographic documentation; temporary utilities and temporary facilities, field offices, temporary controls, field engineering, and similar Work shall be included in the Schedule of Values and proportioned in Applications for Payment throughout duration of the Work.
9. Mobilization and Demobilization:
 - a. Include separate line items under each appropriate payment item for mobilization and demobilization. Document for ENGINEER the activities included in mobilization and demobilization line items.
 - b. Mobilization will be limited to 2percent of the Contract Price, and will be paid in (TBD) payments, each of (TBD)percent of total amount for mobilization.
 - c. Demobilization shall be not less than 1%percent of the Contract Price and shall be included with the Application for Payment following Substantial Completion, or other schedule acceptable to ENGINEER.
10. Costs for Shop Drawings, Samples, and other submittals; operations and maintenance manuals; field testing; and training of operations and maintenance personnel shall be as follows, unless otherwise accepted by ENGINEER:

- a. Up to eight percent of cost (including all associated overhead and profit) of each equipment item, exclusive of transportation and installation costs associated with that item, may be allocated to preparation of Shop Drawings, Samples, and other submittals and may be included in the Application for Payment following ENGINEER's approval of Shop Drawings (and acceptance of other submittals, as applicable) required for fabricating or purchasing for that item for the Work.
 - b. Up to three percent of total cost of each item (including all associated overhead and profit), including materials and equipment, and installation, may be apportioned to testing and included in the Application for Payment following ENGINEER's acceptance of the associated written field testing report(s).
 - c. Up to a total of four percent of equipment cost (including all associated overhead and profit), exclusive of transportation and installation costs, may be apportioned to operations and maintenance manuals and training of operations and maintenance personnel, which may be included in the Application for Payment following completion of training for that item.
11. Project Record Documents:
- a. Include in the Schedule of Values a line item with appropriate value for Project record documents.
 - b. If adequate record documents are maintained, up to 50 percent of the value of the record documents line item will be eligible for payment, spread evenly over those progress payments in which construction at the Site is performed.
 - c. Remainder of Project record documents line item will be eligible for payment when complete record documents are submitted in accordance with the Contract Documents. If record documents submitted are unsatisfactory to ENGINEER, amount may be reduced via set-offs in accordance with the Contract Documents.
13. Coordinate Schedule of Values with cost-loading of the Progress Schedule, in accordance with Section 01 32 16, Progress Schedule.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

++ END OF SECTION ++

SECTION 01 29 76

PROGRESS PAYMENT PROCEDURES

PART 1 – GENERAL

1.1 PROGRESS PAYMENTS

A. Scope:

1. CONTRACTOR's requests for payment shall be in accordance with the Agreement, General Conditions and Supplementary Conditions, and the Specifications.
2. Form: Applications for Payment shall be in the form of Engineers Joint Contract Documents Committee (EJCDC) document EJCDC® C-620, "Contractor's Application for Payment", 2013 edition or later.

B. Procedure:

1. Review with Resident Project Representative (RPR) quantities and the Work proposed for inclusion in each progress payment. Application for Payment shall cover only the Work and quantities recommended by the RPR.
2. CONTRACTOR will be required to review with ENGINEER or RPR the status of record documents in connection with ENGINEER's review of each Application for Payment. Failure to maintain record document current will be just cause for ENGINEER to recommend a reduction in payment for record documents in accordance with Section 01 29 73, Schedule of Values, and will entitle OWNER to set-offs in accordance with the Contract Documents.
3. Submit to ENGINEER printed originals, each with CONTRACTOR's original, "wet" signature, of each complete Application for Payment and other documents to accompany the Application for Payment.
4. ENGINEER will act on request for payment in accordance with the General Conditions and Supplementary Conditions.

C. Each request for progress payment shall include:

1. Completed Application for Payment form, including summary/signature page, progress estimate sheets, and stored materials summary. Progress estimate sheets shall have the same level of detail as the Schedule of Values.
2. Documentation for Stored Materials and Equipment:
 - a. For materials and equipment not incorporated in the Work but suitably stored, submit documentation in accordance with the General Conditions and Supplementary Conditions.
 - b. UCC-1 Financial Statement:

- 1) For each lot or delivery of stored materials and equipment for which payment is requested prior to installation of the item(s) at the Site, complete UCC-1, "Financial Statement" form. On UCC-1 form, indicate OWNER as "security party"; indicate Supplier as "debtor" when stored item(s) are in Supplier's custody, and indicate CONTRACTOR as "debtor" when stored item(s) are in CONTRACTOR's custody; and clearly indicate in detail all stored item(s) included in the filing as "collateral" on the form. Include attachments to the form when necessary to clearly and fully indicate in detail the associated "collateral".
 - 2) File completed UCC-1 form with the secretary of state in the state where the subject item(s) are stored.
 - 3) Include with Application for Payment the completed UCC-1 form together with evidence of filing with the required state(s). Submit UCC-1 form and related documentation once for each lot or delivery of stored items.
- c. Photographs of the stored items at the storage location, in accordance with requirements for progress photographs in Section 01 32 33, Photographic Documentation. Submit photographs sufficient to clearly indicate each stored item, clearly showing marking of OWNER's property in accordance with Paragraph 1.2.C.1 of this section. Such photographs do not count as photographs required under Section 01 32 33, Photographic Documentation. For each month that such item(s) are stored, take and submit monthly new photographs of each stored item.
- d. Legibly indicate on invoice or bill of sale the specific stored materials or equipment included in the payment request and corresponding bid/payment item number for each and the Supplier price for each item.
3. For Payment on the Basis of Cost of the Work Plus a Fee.
- a. When Work included in an Application for Payment will be compensated on the basis of Cost of the Work plus a fee, whether when the entire Contract is compensated on the basis of Cost of the Work plus a fee or when the Application for Payment includes Change Order Work to be compensated on the basis of Cost of the Work plus a fee, the Application for Payment shall include documentation of the costs, including not less than the following:
 - 1) Number and labor classifications of workers employed and hours worked.
 - 2) Construction equipment used including manufacturer, model, and year of manufacture, and number of hours such equipment was onsite and used for the Work compensated on the basis of Cost of the Work.
 - 3) Consumables and similar materials used.
 - 4) Receipts, bills, or invoices for and descriptions of materials and equipment incorporated into the Work.
 - 5) Invoices and labor and equipment breakdowns for Subcontractors, and Suppliers' onsite time, if any.

- 6) Invoices for other expenses included in the Application for Payment, such as travel and subsistence expenses, costs for bonds and insurance, and all other costs and expenses for which compensation is sought in the subject Application for Payment on the basis of Cost of the Work.
 - 7) Other information required by OWNER or ENGINEER,
 - b. Costs for which progress payment is requested on the basis of Cost of the Work plus a fee and for which documentation acceptable to ENGINEER is not submitted will not be eligible for payment.
 - 5. Listing of Subcontractors and Suppliers:
 - a. In accordance with the General Conditions, submit not less than monthly updated listing of all Subcontractors and Suppliers known to CONTRACTOR, whether or not such entities have a contract directly with CONTRACTOR.
 - b. Submit complete information using the form attached to this Section.
 - 6. Allowance Work:
 - a. For payment requests that include payment for Work under an allowance, include with the progress payment request copy of OWNER's authorization of the associated allowance Work, in accordance with Section 01 21 00, Allowances.
 - 7. Partial Release or Reduction of Retainage:
 - a. For each Application for Payment where CONTRACTOR requests partial release or reduction of retainage in any amount (other than request for final payment), submit with associated progress payment request consent of surety to partial release or reduction of retainage, duly completed by CONTRACTOR and surety.
 - b. Acceptable form includes AIA® G707A™, "Consent of Surety to Reduction in or Partial Release of Retainage", 1994 or later edition, or other form acceptable to OWNER.
 - c. For payment requests that include reduction in or payment of retainage in an amount greater than that required by the Contract Documents, obtain OWNER's concurrence for partial release or reduction in retainage prior to submitting such Application for Payment.
- D. Final Payment:
- 1. Requirements for request for final payment are in the General Conditions, as may be modified by the Supplementary Conditions, and Section 01 77 19, Closeout Requirements.
- 1.2 PAYMENT FOR STORED MATERIALS AND EQUIPMENT
- A. Restrictions:
- 1. Provisions of the General Conditions, as may be modified by the Supplementary Conditions, notwithstanding, only the following items of materials or equipment will be eligible for payment when suitably stored, prior to incorporation into the Work.

B. Observation of Stored Materials and Equipment Prior to Application for Payment:

1. General:
 - a. Prior to materials or equipment suitably stored but not yet incorporated into the Work can be eligible for payment, ENGINEER or Resident Project Representative (RPR) shall visit the storage location and verify the extent, condition, and storage environment of the stored items.
 - b. When the same material or equipment item is stored for more than two months, such visits to storage location shall be not less than once every two months.
2. Cost Responsibility for Observations:
 - a. When storage location is less than 20 miles from the Site or less than 20 miles from ENGINEER's office, CONTRACTOR is not responsible for reimbursing OWNER for cost of ENGINEER's time and expenses for observing stored materials and equipment.
 - b. When storage location is more than 20 miles from the Site and more than 20 miles from ENGINEER's office, CONTRACTOR shall reimburse OWNER, via a set-off under the Contract Documents, for cost of ENGINEER's time and expenses, including travel time, to visit the storage location and observe the stored materials and equipment.

C. Other Requirements for Stored Items: Regardless of storage location, perform the following for stored materials and equipment for which payment is sought:

1. Clearly mark each stored container, crate, or item as follows: "Property of FCWS- Alum Project" using permanent marking. Such marking shall not blemish or deface the finish of items that will be exposed to view after installation at the Site.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 ATTACHMENTS

A. The forms listed below, following this Section's "End of Section" designation, are part of this Specification Section:

1. List of Subcontractors and Suppliers form (two pages).

+ + END OF SECTION + +

LIST OF SUBCONTRACTORS AND SUPPLIERS

Owner: _____

Project Name: _____

Contractor: _____ Date: _____

Contract Designation: _____

Indicate below complete information for each Subcontractor and Supplier known to Contractor, regardless of whether the firm has a direct contract with Contractor. Include all lower-tier Subcontractors and associated Suppliers. Copy and paste the paragraphs below as required to indicate all Subcontractors and Suppliers.

SUBCONTRACTORS

1. Subcontractor Name:

- *Address:*
- *Contact Person:*
- *Telephone No.:*
- *E-mail Address:*
- *Work Under Specifications Section Nos.:*
- *Brief Description of Work:*
- *Current Subcontract Price:*
- *Approximate Subcontract Start Date:*
- *Approximate Subcontract End Date:*

2. Subcontractor Name:

- *Address:*
- *Contact Person:*
- *Telephone No.:*
- *E-mail Address:*
- *Work Under Specifications Section Nos.:*
- *Brief Description of Work:*
- *Current Subcontract Price:*
- *Approximate Subcontract Start Date:*
- *Approximate Subcontract End Date:*

3. Subcontractor Name:

- *Address:*
- *Contact Person:*
- *Telephone No.:*
- *E-mail Address:*
- *Work Under Specifications Section Nos.:*
- *Brief Description of Work:*
- *Current Subcontract Price:*
- *Approximate Subcontract Start Date:*
- *Approximate Subcontract End Date:*

Total of Subcontract Prices for all subcontracts equals approximately ____ percent of the Contract Price (*Contractor to fill in blank monthly*)

SUPPLIERS

1. Supplier Name:

- *Address:*
- *Contact Person:*
- *Telephone No.:*
- *E-mail Address:*
- *Furnishing Items Under Specifications Section Nos.:*
- *Brief Description of Items:*
- *Current Purchase Order Amount:*
- *Approximate Purchase Order Date:*
- *Approximate Purchase Order End Date:*

2. Supplier Name:

- *Address:*
- *Contact Person:*
- *Telephone No.:*
- *E-mail Address:*
- *Furnishing Items Under Specifications Section Nos.:*
- *Brief Description of Items:*
- *Current Purchase Order Amount:*
- *Approximate Purchase Order Date:*
- *Approximate Purchase Order End Date:*

3. Supplier Name:

- *Address:*
- *Contact Person:*
- *Telephone No.:*
- *E-mail Address:*
- *Furnishing Items Under Specifications Section Nos.:*
- *Brief Description of Items:*
- *Current Purchase Order Amount:*
- *Approximate Purchase Order Date:*
- *Approximate Purchase Order End Date:*

SECTION 01 31 13

PROJECT COORDINATION

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall coordinate the Work, including testing agencies whether hired by CONTRACTOR, OWNER, or others; Subcontractors, Suppliers, and others with whom coordination is necessary, in accordance with the General Conditions, Supplementary Conditions, and this Section, to perform the Work within the Contract Times and in accordance with the Contract Documents.

B. Coordination:

In accordance with the General Conditions as may be modified by the Supplementary Conditions, CONTRACTOR shall cooperate with and coordinate the Work with other contractors, utility owners, utility service companies, OWNER's and facility manager's employees working at the Site, and other entities working at the Site, in accordance with Section 01 11 13, Summary of Work.

2. CONTRACTOR will not be responsible or liable for damage unless damage is through negligence of CONTRACTOR, or Subcontractors, Supplier, or other entity employed by CONTRACTOR.
3. Attend and participate in all project coordination and progress meetings, and report on the progress of the Work and compliance with the Progress Schedule.

C. Layout and Coordination Drawings:

1. Maintain sufficient competent personnel, drafting and computer-aided drafting/design (CADD) equipment, software, systems, and supplies for preparing layout drawings, coordination drawings, and record documents.
2. With the Contract Documents and Shop Drawings, use such coordination drawings as tools for coordinating the Work of various trades.
3. Where such coordination drawings are to be prepared by mechanical, electrical, plumbing, or heating-ventilating-air conditioning Subcontractors and other Subcontractors, ensure that each Subcontractor maintains required personnel and facilities at the Site.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

++ END OF SECTION ++

SECTION 01 31 18

PRE-CONSTRUCTION CONFERENCE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. A pre-construction conference will be held for the Project.
2. CONTRACTOR shall attend the conference prepared to discuss all items on the pre-construction conference agenda.
3. ENGINEER will distribute an agenda, preside at conference, and prepare and distribute minutes to all conference participants and others as requested.

B. Purpose of Pre-construction Conference:

1. Purpose of conference is to designate responsible personnel, establish working relationships, establish contact information and protocol, discuss preliminary schedules submitted by CONTRACTOR, and review administrative and procedural requirements for the Project.
2. Matters requiring coordination will be discussed and procedures for handling such matters will be established.
3. Unless otherwise indicated in the Contract Documents or otherwise agreed to by the entities involved, Site mobilization meeting will be part of the pre-construction conference.

1.2 PREPARATION FOR PRE-CONSTRUCTION CONFERENCE

A. Date, Time, and Location:

1. Conference will be held after execution of the Contract and before Work starts at the Site.
2. ENGINEER will establish the date, time, and location of conference and notify the interested and involved entities.

B. Submittals Required Prior to Pre-construction Conference:

1. Not less than three days prior to pre-construction conference, submit the following preliminary schedules in accordance with the General Conditions and other requirements of the Contract Documents:
 - a. Preliminary Progress Schedule.
 - b. Preliminary Schedule of Submittals.
 - c. Preliminary Schedule of Values.

- d. Listing of identity and general scope of Work or supply (as applicable) of planned Subcontractors and Suppliers. Indicate extent of each Subcontract proposed and overall percentage of Contract Price to be subcontracted.
- C. CONTRACTOR shall furnish information required and contribute appropriate items for discussion at the pre-construction conference.
- D. Handouts for Pre-Construction Conference:
 - 1. CONTRACTOR shall bring to the conference the following, with sufficient number of copies for each attendee:
 - a. Preliminary Progress Schedule, as submitted to ENGINEER.
 - b. Preliminary Schedule of Submittals, as submitted to ENGINEER.
 - c. Preliminary Schedule of Values, as submitted to ENGINEER.
 - d. Listing of identity and general scope of Work or supply of planned Subcontractors and Suppliers.
 - e. List of emergency contact information, in accordance with Section 01 35 23, Safety Requirements.

1.3 REQUIRED ATTENDEES

- A. Representative of each entity attending the conference shall be authorized to act on that entity's behalf.
- B. Contractor Attendance: Conference shall be attended by CONTRACTOR's:
 - 1. Project manager.
 - 2. Site superintendent
 - 3. Project managers for major Subcontractors, and major equipment Suppliers as CONTRACTOR deems appropriate.
- C. Other attendees will be representatives of:
 - 1. OWNER.
 - 2. ENGINEER.
 - 3. Resident Project Representative (RPR), if available.
 - 4. Authorities having jurisdiction over the Work, if available.
 - 5. Utility owners, as applicable.
 - 6. Others as requested by OWNER, CONTRACTOR, or ENGINEER.

1.4 AGENDA

- A. Preliminary Agenda: Be prepared to discuss in detail the topics indicated below. Revisions, if any, to the agenda below will be furnished to required attendees prior to the pre-construction conference.

1. Procedural and Administrative:
 - a. Personnel and Teams:
 - 1) Designation of roles and personnel.
 - 2) Limitations of authority of personnel, including personnel who will sign Contract modifications and make binding decisions.
 - 3) Subcontractors and Suppliers in attendance.
 - 4) Authorities having jurisdiction.
 - b. Procedures for communications and correspondence, including electronic communication protocols.
 - c. Copies of the Contract Documents and availability.
 - d. Subcontractors and Suppliers.
 - 1) Lists of proposed Subcontractors and Suppliers.
 - e. The Work and Scheduling:
 - 1) General scope of the Work.
 - 2) Contract Times, including Milestones (if any).
 - 3) Phasing and sequencing.
 - 4) Preliminary Progress Schedule.
 - 5) Critical path activities.
 - f. Safety:
 - 1) Responsibility for safety.
 - 2) Contractor's safety representative.
 - 3) Emergency procedures and accident reporting.
 - 4) Emergency contact information.
 - 5) Confined space entry permits.
 - 6) Hazardous materials communication program.
 - 7) Impact of Project on public safety.
 - g. Permits.
 - h. Review of insurance requirements and insurance claims.
 - i. Coordination:
 - 1) Project coordination, and coordination among contractors.
 - 2) Construction coordinator.
 - 3) Coordination with Owner's operations.

- 4) Progress meetings.
 - 5) Preliminary Schedule of Submittals.
 - 6) Procedures for furnishing and processing submittals.
 - 7) Work not eligible for payment until submittals are approved or accepted (as required).
 - 8) Construction photographic documentation.
- j. Submittals:
- 1) Preliminary Schedule of Submittals.
 - 2) Submittal procedures.
 - 3) Contractor coordination and approval stamp.
 - 4) Meaning of Engineer's actions/submittal disposition.
 - 5) Preliminary discussion of initial, critical submittals.
 - 6) Construction photographic documentation.
- k. Substitutes and "Or-Equals":
- 1) Product options.
 - 2) Procedures for proposing "or-equals".
 - 3) Procedures for proposing substitutes.
- l. Contract Modification Procedures
- 1) Requests for interpretation
 - 2) Written clarifications
 - 3) Field Orders
 - 4) Proposal Requests
 - 5) Change Proposals
 - 6) Work Change Directives.
 - 7) Change Orders.
 - 8) Procedure for Claims and dispute resolution
- m. Payment:
- 1) Owner's Project financing and funding, as applicable.
 - 2) Owner's tax-exempt status.
 - 3) Preliminary Schedule of Values
 - 4) Procedures for measuring for payment.
 - 5) Retainage.

- 6) Progress payment procedures.
 - 7) Prevailing wage rates and payrolls.
- n. Testing and inspections, including notification requirements.
- o. Disposal of demolition materials.
- p. Record documents.
- q. Preliminary Discussion of Contract Closeout:
 - 1) Procedures for Substantial Completion.
 - 2) Contract closeout requirements.
 - 3) Correction period.
 - 4) Duration of bonds and insurance.
- 2. Site Mobilization (if not covered in a separate meeting):
 - a. Working hours and overtime.
 - b. Field offices, storage trailers, and staging areas.
 - c. Temporary facilities.
 - d. Temporary utilities and limitations on utility consumption (where applicable).
 - e. Utility company coordination (if not done as a separate meeting).
 - f. Access to Site, access roads, and parking for construction vehicles.
 - g. Maintenance and protection of traffic.
 - h. Use of Site and premises.
 - i. Protection of property.
 - j. Security.
 - k. Temporary controls, such as sediment and erosion controls, noise controls, dust control, storm water controls, and other such measures.
 - l. Site barriers and temporary fencing.
 - m. Storage of materials and equipment.
 - n. Reference points and benchmarks; surveys and layouts.
 - o. Site maintenance during the Project.
 - p. Cleaning and removal of trash and debris.
 - q. Restoration.
- 3. General discussion and questions.
- 4. Next meeting.

5. Site visit, if required.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

++ END OF SECTION ++

SECTION 01 31 19

PROGRESS MEETINGS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Progress meetings will be held throughout the Project. CONTRACTOR shall attend each progress meeting prepared to discuss in detail all items on the agenda.
2. ENGINEER will preside at progress meetings and will prepare and distribute minutes of progress meetings to all meeting participants and others as requested.

1.2 PREPARATION FOR PROGRESS MEETINGS

A. Date and Time:

1. Regular Meetings: Monthly on a day and time agreeable to OWNER, ENGINEER, and CONTRACTOR.
2. Other Meetings: As required.

B. Location:

1. CONTRACTOR's field office at the Site or other location mutually agreed upon by OWNER, CONTRACTOR, and ENGINEER.

C. Handouts:

1. CONTRACTOR shall bring to each progress meeting not less than five (5) copies of each of the following:
 - a. List of Work accomplished since the previous progress meeting.
 - b. Up-to-date Progress Schedule.
 - c. Up-to-date Schedule of Submittals.
 - d. Detailed "look-ahead" schedule of Work planned through the next progress meeting, with specific starting and ending dates for each activity, including shutdowns, deliveries of important materials and equipment, Milestones (if any), and important activities affecting the OWNER, Project, and Site.
 - e. When applicable, list of upcoming, planned time off (with dates) for personnel with significant roles on the Project, and the designated contact person in their absences

1.3 REQUIRED ATTENDANCE

- A. Representatives present for each entity shall be authorized to act on that entity's behalf.
- B. Required Attendees:
 - 1. CONTRACTOR:
 - a. Project manager.
 - b. Site superintendent.
 - c. Safety representative.
 - d. When needed for the discussion of a particular agenda item, representatives of Subcontractors and Suppliers shall attend meetings.
 - 2. Construction coordinator (if any).
 - 3. ENGINEER:
 - a. Project manager or designated representative
 - b. Resident Project Representative (if any).
 - c. Others as required by ENGINEER.
 - 4. OWNER's representative(s), as required.
 - 5. Testing and inspection entities, as required.
 - 6. Others, as appropriate.

1.4 AGENDA

- A. Preliminary Agenda: Be prepared to discuss in detail the topics listed below. Revised agenda, if any, will be furnished to CONTRACTOR prior to first progress meeting. Progress meeting agenda may be modified by ENGINEER during the Project as required.
 - 1. Review, comment, and amendment (if required) of minutes of previous progress meeting.
 - 2. Review of progress since the previous progress meeting.
 - 3. Planned progress through next progress meeting.
 - 4. Review of Progress Schedule
 - a. Contract Times, including Milestones (if any)
 - b. Critical path.
 - c. Schedules for fabrication and delivery of materials and equipment.
 - d. Corrective measures, if required.

- e. Planned outages
- 5. Submittals:
 - a. Review status of critical submittals.
 - b. Review revisions to Schedule of Submittals.
- 6. Contract Modifications
 - a. Requests for interpretation
 - b. Written clarifications
 - c. Field Orders
 - d. Proposal Requests
 - e. Change Proposals
 - f. Work Change Directives.
 - g. Change Orders.
 - h. Claims.
- 7. Applications for progress payments.
- 8. Problems, conflicts, and observations.
- 9. Quality standards, testing, and inspections.
- 10. Coordination between parties.
- 11. Site management issues, including access, security, maintenance and protection of traffic, maintenance, cleaning, and other Site issues.
- 12. Safety.
- 13. Permits.
- 14. Construction photographic documentation.
- 15. Record documents status.
- 16. Punch list status, as applicable.
- 17. Other business.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 31 26

ELECTRONIC COMMUNICATION PROTOCOLS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section establishes the procedures with which the parties will comply regarding transmission or exchange of electronic data for the Project.
2. CONTRACTOR shall provide labor, materials, tools, equipment, services, utilities, and incidentals shown, specified, and required for complying with this Section throughout the Project.
3. This Section does not supersede the General Conditions, as may be modified by the Supplementary Conditions, regarding transmitting of the Contract Documents to CONTRACTOR after the Effective Date of the Contract.
4. In addition to the requirements of this Section, comply with requirements for exchange of electronic data in the following:
 - a. Section 01 32 16, Progress Schedule.
 - b. Section 01 32 33, Photographic Documentation.
 - c. Section 01 33 00, Submittal Procedures.
 - d. Section 01 78 39, Project Record Documents.

B. Coordination:

1. CONTRACTOR shall require all Subcontractors and Suppliers to comply with the electronic communication protocols established in this Section.

C. Related sections:

1. Section 01 32 16, Progress Schedule.
2. Section 01 32 33, Photographic Documentation.
3. Section 01 33 00, Submittal Procedures.
4. Section 01 78 39, Project Record Documents.

1.2 TERMINOLOGY

- A. The following words or terms are not defined but, when used in this section, have the following meaning:
1. “Electronic data” means information, communications, drawings, or designs created or stored for the Project in electronic or digital form.
 2. “Confidential information” means electronic data that the transmitting party has designated as confidential and clearly marked with an indication such as “Confidential”, “Business Proprietary”, or similar designation.
 3. “Written” or “in writing” means any and all communications, including without limitation a notice, consent, or interpretation, prepared and sent to an address provided in the Contract Documents or otherwise agreed upon by the parties and ENGINEER using a transmission method sent forth in this Section that allows the recipient to print or store the communication. Communications transmitted electronically are presumed received when sent in conformance with this Article 0.A.3.

1.3 TRANSMISSION OF ELECTRONIC DATA

- A. Transmission of electronic data constitutes a warrant by the transmitting party to the receiving party that the transmitting party is one or more of the following:
1. The copyright owner of the electronic data.
 2. Has permission from the copyright owner to transmit the electronic data for its use on the Project.
 3. Is authorized to transmit confidential information.
- B. Receiving party agrees to keep confidential information confidential and not to disclose it to another person except to (1) its employees, (2) those who need to know the content of the confidential information to perform services or construction solely and exclusively for the Project, or (3) its consultants, contractors, Subcontractors, and Suppliers whose contracts include similar restrictions on the use of electronic data and confidential information.
- C. Transmitting party does not convey any right in the electronic data or in the software used to generate or transmit such data. Receiving party may not use electronic data unless permission to do so is provided in the Contract Documents, or in a separate license.
- D. Unless otherwise granted in a separate license, receiving party’s use, modification, or further transmission of electronic data, as provided the Contract Documents, is specifically limited to the design and construction of the Project in accordance with this Section, and nothing contained in this Section conveys any other right to use the electronic data for any other purpose.
- E. To the fullest extent permitted by Laws and Regulations, receiving party shall indemnify and defend the transmitting party from and against all claims arising

from or related to receiving party's modification to, or unlicensed use of, electronic data.

- F. Means of Transmitting Electronic Data: Unless otherwise indicated in Table 01 31 26-A of this Section or elsewhere in the Contract Documents, transmission of electronic data for the Project will generally be via:
 - 1. E-mail and files attached to e-mail. Maintain e-mail system capable of transmitting and receiving files not less than 20 megabytes (MB) file size.

1.4 ELECTRONIC DATA PROTOCOLS

- A. Comply with the data formats, transmission methods, and permitted uses set forth in table 01 31 26-a, electronic data protocol table, below, when transmitting or using electronic data on the project. Where a row in the table has no indicated means of transmitting electronic data, use for such documents only printed copies transmitted to the receiving party via appropriate delivery method.

TABLE 01 31 26-A
ELECTRONIC DATA PROTOCOL TABLE (E-MAIL ATTACHMENTS)

Electronic Data	Data Format	Transmitting Party	Transmission Method	Receiving Party	Permitted Uses	Notes
1.04.A.1. Project communications						
General communications & correspondence	EM, PDF	O, E, C	EM, EMA	O, E, C	R	
Meeting notices and agendas	EM, PDF	E	EM, EMA	O, C	R	
Meeting minutes	PDF	E	EM, EMA	O, C	R	
1.04.A.2. Contractor's submittals to Engineer						
Shop Drawings	PDF	C	EMA	E	M (1)	(1)
Product data	PDF	C	EMA	E	M (1)	(1)
Informational and closeout submittals:	PDF	C	EMA	E	M (1)	(1) (6)
Documentation of delivery of maintenance materials submittals	PDF	C	EMA	E	M (1)	
1.04.A.3. Engineer's return of reviewed submittals to Contractor						
Shop Drawings	PDF	E	EMA	O., C	R	
Product data	PDF	E	EMA	O., C	R	
Informational and closeout submittals:	PDF	E	EMA	O., C	R	(6)
Documentation of delivery of maintenance materials submittals	PDF	E	EMA	O. C	R	
1.04.A.4. Contract Modifications Documents						
Requests for interpretation to Engineer	PDF	C., O	EMA	E	M (1)	(1)
Engineer's interpretations (RFI responses)	PDF	E	EMA	C, O	R	
Engineer's clarifications to Contractor	EM, PDF	E	EM, EMA	C, O	R	
Engineer's issuance of Field Orders	PDF	E	EMA	C, O	R	
Proposal Requests	PDF	E, O	EMA	C	R	
Change Proposals – submitted to Engineer	PDF	C	EMA	O, E	S	
Change Proposals – Engineer's response	PDF	E	EMA	C. O		
Work Change Directives (for Contractor signature)	PDF	E	EMA	C	R	(2)
Change Orders (for Contractor signature)	PDF	E	EMA	C	R	(2)
1.04.A.5. Applications for Payment						(3)
1.04.A.6. Claims and other notices						(4)
1.04.A.7. Closeout Documents						
Record drawings	DWG and PDF	C	EMA	E, O	M (5)	(5)
Other record documents	PDF	C	EMA	E. O	M (5)	(5)
Contract closeout documents						

A. Key to Electronic Data Protocol Table:
Data Format:

EM	.msg, .htm, .txt, .rtf, e-mail text
W	.docx, Microsoft® Word 2007 or later
EX	.xlsx, Microsoft® Excel 2007 or later
PDF	.pdf. Portable Document Format
DWG	.dwg. Autodesk AutoCAD 2013 drawing or later.

Transmitting Party:

O	OWNER
C	CONTRACTOR
E	ENGINEER

Transmission Method:

EM	Via e-mail
EMA	As an attachment to an e-mail transmission

Receiving Party:

O	OWNER
C	CONTRACTOR
E	ENGINEER

Permitted Uses:

S	Store and view only
R	Reproduce and distribute
I	Integrate (incorporate additional electronic data without modifying data received)
M	Modify as required to fulfill obligations for the Project

Notes:

- (1) Modifications by ENGINEER to CONTRACTOR's submittals and requests for interpretations are limited to printing out, marking-up, and adding comment sheets.
- (2) May be distributed only to affected Subcontractors and Suppliers. Print out, sign document, and return executed printed copy originals to ENGINEER.
- (3) Submit printed Applications for Payment with original ("wet") signatures.

- (4) Submit notices, including Claims, in accordance with the notice provisions of the General Conditions, as may be modified by the Supplementary Conditions.
- (5) Submit record drawings in native CAD format indicated when CONTRACTOR has executed ENGINEER's standard agreement for release of electronic files. In addition, always submit record drawings as a PDF file. Comply with requirements of Section 01 78 39, Project Record Documents.
- (6) For operation and maintenance data, also submit printed copies as required by Section 01 78 23, Operations and Maintenance Data.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

++ END OF SECTION ++

SECTION 01 32 16

PROGRESS SCHEDULE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall prepare and submit Progress Schedules and related documents in accordance with the General Conditions, as may be modified by the Supplementary Conditions, and this Section, unless otherwise accepted by ENGINEER.
2. Maintain and update Progress Schedules and related documents.
3. Progress Schedule shall be resource- and cost-loaded CPM Progress Schedule.
4. ENGINEER's acceptance of the Progress Schedule or related documents, and comments or opinions concerning activities in the Progress Schedule and related documents shall not control CONTRACTOR's independent judgment concerning means, methods, techniques, sequences and procedures of construction, unless the associated means, method, technique, sequence, or procedure is directed by the Contract Documents. CONTRACTOR is solely responsible for complying with the Contract Times.

B. Use of float:

1. Float belongs to the Project and may be used by OWNER or CONTRACTOR to accommodate changes in the Work, or to mitigate the effect of events that delay performance or compliance with the Contract Times.
2. Changes or delays that influence Activities that have float and that do not extend the Critical Path are not justification for an extension of the Contract Times.

C. Factors Affecting the Progress Schedule:

1. In preparing the Progress Schedule, take into consideration submittal requirements and submittal review times, time for fabricating and delivering materials and equipment, source quality control (including shop testing) and field quality control (including testing at the Site), Subcontractors' work, availability and abilities of workers, availability of construction equipment, weather conditions, restrictions in operations at the Site and coordination with OWNER's operations, and other factors

that have the potential to affect completion of the Work within the Contract Times.

2. Comply with sequencing requirements indicated in the following:
 - a. Section 01 11 13, Summary of Work.
 - b. Section 01 13 13, Milestones.

1.2 DEFINITIONS

- A. The following terms are defined for this Section and supplement the terms defined in the General Conditions and Supplementary Conditions:
 1. Activity: An element of the construction work that has the following specific characteristics: consumes time, consumes resources, has a definable start and finish, is assignable, and is measurable.
 2. Constraint: An imposed date on the Progress Schedule or an imposed time between Activities. The Contract Times are Constraints.
 3. CPM Progress Schedule: Computerized Progress Schedule in Critical Path Method (CPM) format which accounts for the entire Work, defines the interrelationships between elements of the Work, reflects the uncompleted Work, and indicates the sequence with which the Work has been completed, indicates the sequence in which uncompleted Work will be completed, and indicates the duration of each Activity.
 4. Critical Path: The continuous chain of Activities with the longest duration for completion within the Contract Times.
 5. Early Start: The earliest possible date an Activity can start according to the assigned relationships among Activities.
 6. Early Finish: The earliest date an Activity can finish according to the assigned relationships among the Activities.
 7. Late Finish: The latest date an Activity can finish without extending the Contract Times.
 8. Late Start: The latest date an Activity can start without extending the Contract Times.
 9. Float: The time difference between the calculated duration of the Activity chain and the Critical Path.
 10. Total Float: The total number of days that an Activity (or chain of Activities) can be delayed without affecting the Contract Times.
 11. Network Diagram: A time-scaled logic diagram depicting the durations and relationships of the Activities.
 12. Work Areas, Area, or System: A logical breakdown of the Project elements or a group of Activities which, when collectively assembled, are

readily identifiable on the Project (for example: yard piping, a structure or building, a treatment process, or other logical grouping).

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Progress Schedule Preparer:

- a. CONTRACTOR shall self-prepare and maintain the Progress Schedule using qualified employee with experience in scheduling, and experienced with the scheduling software required for the Project, and experience serving as Progress Schedule preparer on construction projects of similar type, size, and scope to this Project.
- b. Progress Schedule preparer shall have not less than five years experience using the schedule software required on construction projects of similar type, size, and scope as the Project.
- c. Prior to engaging a scheduling consultant or using a qualified employee, submit to ENGINEER the following:
 - 1) Name and address of proposed Progress Schedule preparer and the names of personnel who will be assigned to scheduling the Project.
 - 2) Information sufficient to demonstrate that proposed Progress Schedule preparer and scheduling personnel to be assigned to the Project possess qualifications complying with this Section. For each person assigned, submit list of similar type, size, contract value of projects, names and contact information of engineer or architect and owner.
- d. Engineer's Review of Qualifications:
 - 1) ENGINEER will respond to CONTRACTOR whether proposed scheduling personnel are acceptable within five (5) days after ENGINEER's receipt of complete qualifications.
 - 2) If qualifications are not acceptable, submit qualifications of acceptable personnel within five (5) days of receipt of ENGINEER's non-acceptance.
 - 3) ENGINEER's acceptance or non-acceptance of qualifications does not release CONTRACTOR from its obligations under the Contract Documents.

B. Scheduling Workshop Conferences:

1. Prior to preparing the preliminary Progress Schedule, CONTRACTOR shall meet with ENGINEER and OWNER for one (1) workshop conference, up to four (4) hours in duration, to review technical requirements and Progress Schedule development methods and procedures.
2. Required Attendance:
 - a. CONTRACTOR's project manager, site superintendent, and Progress Schedule preparer.
 - b. ENGINEER
 - c. OWNER may attend one or more scheduling workshop conferences.
3. ENGINEER will prepare minutes of the scheduling workshop conferences and distribute minutes to each attendee.

1.4 SUBMITTALS

- A. Quantity of each submittal required and timing of submittals are in this Section.
- B. Informational Submittals: Submit the following:
 1. Initial Progress Schedules:
 - a. Preliminary Progress Schedule with associated Network Diagrams and narrative report.
 - b. Acceptable Progress Schedule with associated Network Diagrams and narrative report.
 - c. Preliminary resource- and cost-loaded Progress Schedule and associated reports.
 - d. Acceptable resource- and cost-loaded Progress Schedule and associated reports.
 - e. Submit each Progress Schedule submittal with letter of transmittal complying with requirements of Section 01 33 00, Submittal Procedures.
 2. Progress Schedule Updates.
 - a. Progress Schedule updates shall comply with requirements of this Section, and shall include updated Progress Schedule, narrative report, updated Network Diagram when relationships among Activities are changed, and updated mathematical tabulations.
 - b. Submit updated Progress Schedule prior to each progress meeting. When a Progress Schedule remains unchanged from one progress meeting to the next, submit a written statement to that effect. In addition to monthly Progress Schedule submittals, also bring to

progress meeting the number of printed copies of the updated Progress Schedule indicated in Section 01 31 19, Progress Meetings.

3. Look-Ahead Schedules
 - a. Furnish 15-day look-ahead schedule at each progress meeting.
4. Time Impact Analyses: Submit in accordance with this Section.
5. Recovery Schedule: Submit in accordance with this Section.
6. Qualifications:
 - a. Submit qualifications of Progress Schedule preparer, and other personnel that will assist Progress Schedule preparer in preparing and maintaining the Progress Schedule.

1.5 INITIAL PROGRESS SCHEDULES

- A. Type and Organization of Progress Schedules:
 1. Prepare Progress Schedule using Oracle Primavera P6 software, unless other scheduling software is acceptable to OWNER.
 2. Sheet Size: 22 inches by 34 inches, unless otherwise accepted by ENGINEER.
 3. Time Scale: Indicate first date of each work week.
 4. Activity Designations: Indicate title and related Specifications Section number.
 5. Progress Schedules shall be CPM Progress Schedules.
 6. Organization:
 - a. Indicate on the separate Schedule of Submittals dates for submitting and reviewing Shop Drawings, Samples, and other submittals.
 - b. Group deliveries of materials and equipment into a separate sub-schedule that is part of the Progress Schedule.
 - c. Group construction into Work Area sub-schedules (that are part of the Progress Schedule) by Activity.
 - d. Clearly indicate the Critical Path on the Progress Schedule.
 - e. Organize each Work Area sub-schedule by Specifications Section number.
- C. Preliminary Progress Schedule:

Progress Schedule

1. Within fifteen (15) days after the Contract Times commence running, CONTRACTOR shall submit to ENGINEER the preliminary Progress Schedule covering the entire Project, with associated Network Diagrams.
2. Submit preliminary Progress Schedule in accordance Section 01 33 00, Submittal Procedures.
3. ENGINEER will conduct a timely review of the preliminary Progress Schedule.
4. Preliminary Progress Schedule shall comply with the Contract Documents relative to Progress Schedules, but need not be resource- or cost-loaded.

D. Initial Acceptance of Progress Schedule:

1. Not less than ten (10) days before submission of the first Application for Payment, a scheduling conference attended by CONTRACTOR, Progress Schedule preparer, ENGINEER, and others as appropriate will be held at the Site to review for acceptability to ENGINEER the preliminary Progress Schedule and associated Network Diagram and other reports and schedule-related documents required. Following the scheduling conference, CONTRACTOR shall have five (5) days to make corrections and adjustments and to complete and resubmit the Progress Schedule and associated Network Diagram. No progress payment will be made to CONTRACTOR until acceptable Progress Schedule, Network Diagram, and other reports and schedule-related documents required are submitted to ENGINEER.
2. Submit acceptable Progress Schedule, together with Network Diagram, reports, and other schedule-related documents required to accompany the initial acceptable Progress Schedule, in accordance with the Submittals Article of this Section, Section 01 31 26, Electronic Communication Protocols, and Section 01 33 00, Submittal Procedures. Also submit acceptable form of Progress Schedule in its native format generated by the scheduling software, transmitted using the transmission method indicated in Section 01 31 26, Electronic Communication Protocols.
3. The Progress Schedule will be acceptable to ENGINEER if it provides an orderly progression of the Work to completion within the Contract Times, in accordance with the Contract Documents. 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.
4. Initially-accepted Progress Schedule shall be identified as the baseline Progress Schedule.

E. Resource- and Cost-Loaded Progress Schedule:

1. Not more than ten (10) days after ENGINEER's acceptance of the Progress Schedule, submit to ENGINEER resource- and cost-loaded Progress Schedule complying with resource- and cost-loading requirements in this Section.
 2. Submit of the preliminary and the acceptable resource- and cost-loaded Progress Schedules and associated reports to accompany the initial submittals of resource (and cost-loaded Progress Schedules in accordance with the Submittals Article of this Section, Section 01 31 26, Electronic Communication Protocols, and Section 01 33 00, Submittal Procedures. Also submit preliminary and acceptable form of resource- and cost-loaded Progress Schedules in its native format generated by the scheduling software, transmitted using the transmission method indicated in Section 01 31 26, Electronic Communication Protocols.
 3. Resource- and cost-loaded Progress Schedules will be reviewed by ENGINEER within ten (10) days of ENGINEER's receipt, and ENGINEER's comments will be transmitted to CONTRACTOR.
 4. Make revisions required in accordance with ENGINEER's comments and resubmit to ENGINEER within five (5) days of CONTRACTOR's receipt of ENGINEER's comments.
 5. Resource- and cost-loaded Progress Schedule accepted by ENGINEER shall be the basis for determining the amount of each CONTRACTOR progress payment.
- F. If the Progress Schedule reflects completion date(s) different than the Contract Times, the Contract Times are not thereby voided, nullified, or affected. The Contract Times govern. Where the Progress Schedule reflects completion date(s) that are earlier than the Contract Times, ENGINEER may accept such Progress Schedule with CONTRACTOR to specifically understand that no Change Request or Claim for additional Contract Times or additions to the Contract Price shall be brought against OWNER resulting from CONTRACTOR's failure to complete the Work by the earlier date(s) indicated on the accepted Progress Schedule.

1.6 PROGRESS SCHEDULE UPDATES

A. Updates:

1. Update the Progress Schedule not less-often than once per month. If during progress of the Work events develop that necessitate changes in the initially accepted Progress Schedule (e.g., baseline Progress Schedule), identify updated Progress Schedules sequentially as "Progress Schedule Revision 1", "2", "3", and continuing in sequence as required. Number the Progress Schedule submittals in accordance with Section 01 33 00, Submittal Procedures.

2. CONTRACTOR's Progress Schedule update shall include a narrative report in accordance with this Section. Narrative report shall include description of current progress and status of each Area of the Project, a description of progress for the period, a description of the Critical Path, a discussion of current or potential delays, Change Orders (pending and approved in since the previous Progress Schedule update), and other problems associated with maintaining the Work on schedule.
3. The update to the Progress Schedule shall be based on retained logic. Progress override logic is not allowed.
4. Required scheduling software, and schedule organization, format, and content for updated Progress Schedules are identical to that required in this Section for initial Progress Schedules.
5. Submit to ENGINEER updated Progress Schedule, together with Network Diagram (when required), reports, and other schedule-related documents required to accompany the updated Progress Schedule, in accordance with Section 01 31 26, Electronic Communication Protocols, and Section 01 33 00, Submittal Procedures. Also submit updated Progress Schedule in its native format generated by the scheduling software, transmitted using the transmission method indicated in Section 01 31 26, Electronic Communication Protocols.
6. Submit updated Network Diagrams when revisions are proposed to the logic. Indicate in the narrative report delays that have occurred since the previous updated Progress Schedule. ENGINEER will not recommend payment by OWNER of progress payments until updated Progress Schedule is received, reviewed, and accepted by ENGINEER. Payment for out-of-sequence Work is not allowed.

B. Monthly Schedule Meeting:

1. During the month, utilizing the previous month's 15-day look-ahead schedule. CONTRACTOR shall record the percent complete, start and finish dates of each scheduled Activity with the remaining duration for each Activity started but not completed, including Activities associated with procurement of materials and equipment.
2. On the same day each month, not less than one week prior to a progress meeting, CONTRACTOR, Progress Schedule preparer, ENGINEER, and others as appropriate shall meet at the Site and tour the Work to review and update the schedule and progress information gathered by CONTRACTOR during the month. After acceptance of CONTRACTOR's updated data, Progress Schedule preparer shall use this information to update the Progress Schedule.

1.7 NETWORK DIAGRAMS (PERT CHARTS)

A. Network Diagrams – General:

1. Prepare and submit Network Diagrams, as generated using the scheduling software suitable for printing on paper of the size indicated for Progress Schedules in this Section.
2. Group Network Diagrams by Area and show the order and interdependence of Activities and sequence and quantities in which the Work will be accomplished.
3. Do not use match lines on Network Diagrams. Depict interrelationships to or from Activities outside the Area shown using an Activity symbol with Activity number and description.
4. In preparing Network Diagrams, comply with the basic concept of precedence diagramming method (PDM) network scheduling to show how start of a given Activity depends on completion of preceding Activities, and how the Activity's completion may affect the start of subsequent Activities.
5. Level of schedule detail shall define the day-to-day Activities of the Work.

B. Network Diagram Content:

1. Clearly indicate the Critical Path and distinguish the Critical Path from other paths on the network.
2. Organize Network Diagrams by grouping into major Work Areas, including one for procurement of materials and equipment, and by specific Activity within each Area.
3. Logic diagrams shall include the following:
 - a. Activity number.
 - b. Activity description.
 - c. Activity duration (in work days).
 - d. Critical Path denoted.
 - e. Float for each Activity.
 - f. Activity or System designation.
 - g. Coded Area designation.
 - h. Responsibility code (e.g., CONTRACTOR, Subcontractor, trade, operation, Suppliers, or other entity responsible for accomplishing an Activity).
 - i. Shift number (if more than one shift per day is to be employed).

C. Network Diagram Revisions:

1. General:
 - a. When conditions develop that require revisions to logic or durations of the Network Diagram associated with the initially accepted Progress Schedule (e.g., baseline Progress Schedule), identify updates to the Network Diagram in the same manner required in this Section for Progress Schedule updates.
 - b. Revision of the logic or durations from the baseline Progress Schedule initially accepted by ENGINEER shall be submitted to ENGINEER for acceptance.
 - c. Incorporate into the Progress Schedule revisions to logic or duration accepted by ENGINEER, and include in monthly narrative report both a description of revisions and listing of Activities affected by revisions.
 - d. Changes resulting from Change Orders, Work Change Directives, Field Orders, allowance authorizations, and other additions or deletions, shall be fully incorporated into the Progress Schedule and Network Diagram on the first update after the associated Change Orders, Work Change Directive, or allowance authorization is approved by OWNER, or Field Order issued by ENGINEER, including adjustments to the Contract Price (if any).
2. Submit revised Network Diagrams with updated Progress Schedule submittals.

1.8 RESOURCE AND COST LOADING REPORTS

- A. Resource Loading:
 1. After ENGINEER's initial acceptance of the Progress Schedule, CONTRACTOR shall assign resources for personnel labor-hours, materials, and equipment to each construction Activity within each responsibility code. Submit resource schedule reports with each updated Progress Schedule.
- B. Cost Loading:
 1. Assign to each Activity a total dollar amount commensurate with its value relative to the associated line item in the Schedule of Values accepted by the ENGINEER. Submit cost reports for the initially accepted cost-loaded Progress Schedule and each subsequent update of the Progress Schedule.
 2. After the cost-loaded Progress Schedule is accepted by ENGINEER, each Application for Payment will be on the basis of earned revenue as indicated in updates of the Progress Schedule.

1.9 NARRATIVE REPORT

- A. Prepare and include with the preliminary Progress Schedule and each subsequent Progress Schedule submittal, written narrative report describing the schedule-related requirements of the Contract Documents and CONTRACTOR's plan and schedule for complying with such requirements. Narrative report shall describe the methods of sequencing and operation, resources to be employed, time frames for the construction of each of the major Systems on the Project, and time frames for complying with the Contract Times and CONTRACTOR's interim schedule milestones.

1.10 TIME IMPACT ANALYSIS

- A. Time Impact Analyses – General:
 - 1. Prepare and submit a time impact analysis when one or more of the following occurs: a Change Proposal is prepared, a Work Change Directive is issued that will affect the Progress Schedule, or when delays are experienced. Time impact analysis shall illustrate the influence of each Change Order, Work Change Directive, allowance authorization, or delay, as applicable, on the Contract Times and schedule milestones.
 - 2. Each time impact analysis shall include a sketch (fragnet) demonstrating how CONTRACTOR proposes to incorporate the changes in the Work or, as applicable, delays into the Progress Schedule. Fragnet shall include all logic, resource and cost changes, and additions required as result of said Change Order, Work Change Directive, allowance authorization, or delay.
 - 3. Fragnet shall show all CPM logic revisions for the Work associated with the Change Order, Work Change Directive, allowance authorization, or delay and its relationship to other Activities in the Network Diagram.
 - 4. Time impact analysis shall demonstrate the time impact, based on date the Change Order, Work Change Directive, or allowance authorization was given to CONTRACTOR, or as applicable the date the delay was implemented; the status of the Work at that point in time; and the Activity duration of affected Activities. Activity duration used in the time impact analysis shall be those included in the latest update of the Progress Schedule accepted by ENGINEER, closest to the time of the start of the delay or start of the Change Order, Work Change Directive, or allowance authorization as adjusted by mutual, written agreement of the parties and ENGINEER.
 - 5. Timing of Time Impact Analysis:
 - a. Submit each time impact analysis within five (5) days after the following, as applicable:
 - 1) Start of the delay.
 - 2) After the submittal of Change Proposal.

- 3) After CONTRACTOR receipt of Work Change Directive.
 - b. When CONTRACTOR does not submit time impact analysis for a specific change or delay, within the specified period of time for such submittal, such non-submittal shall be construed that no extension of the Contract Times is required.
- B. Evaluation by Engineer and Acceptance:
1. ENGINEER's evaluation of each time impact analysis comprised of complete information will be completed in timely manner after ENGINEER's receipt. Changes in the Contract Times will be made only by Change Order.
 2. When mutual agreement is reached between the parties on effect of the change or delay in the Project, incorporate into the next Progress Schedule update the associated fragnets illustrating the influence of changes and delays.

1.11 RECOVERY SCHEDULES

- A. Recovery Schedules – General:
1. When updated Progress Schedule indicates that the ability to comply with the Contract Times falls fifteen (15) or more days behind schedule, and there is no excusable delay, Change Order, or Work Change Directive to support an extension of the Contract Times, CONTRACTOR shall prepare and submit a Progress Schedule demonstrating CONTRACTOR's plan to accelerate the Work to achieve compliance with the Contract Times ("recovery schedule") for ENGINEER's acceptance.
 2. Submit recovery schedule within five (5) days after submittal of updated Progress Schedule where need for recovery schedule is indicated.
- B. Implementation of Recovery Schedule:
1. At no additional cost to OWNER, do one or more of the following: furnish additional labor, provide additional construction equipment, provide suitable materials, employ additional work shifts, expedite procurement of materials and equipment to be incorporated into the Work, and other measures necessary to complete the Work within the Contract Times.
 2. Upon acceptance of recovery schedule by ENGINEER, incorporate recovery schedule into the next Progress Schedule update.
- C. Lack of Action:
1. CONTRACTOR's refusal, failure, or neglect to take appropriate recovery action, or to submit a recovery schedule, shall constitute reasonable evidence that CONTRACTOR is not prosecuting the Work or separable part thereof with the diligence that will ensure completion within the Contract Times. Such lack of action shall constitute sufficient basis for

OWNER to exercise remedies available to OWNER under the Contract Documents.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

++ END OF SECTION ++

SECTION 01 32 33

PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall furnish all equipment, labor, materials required to provide the OWNER services specified, including:
 - a. Digital photography.
 - b. Digital videography.
2. Furnish photographic documentation for the following:
 - a. Pre-construction.
 - b. Construction progress.
 - c. Final.

B. Image Quality:

1. Photographic documentation shall be in color.
2. Photographic images shall be suitably staged and set up ("framed"), focused, and shall have adequate lighting to illuminate the Work and conditions that are the subject of the photograph.
3. For still photographs, use camera with minimum 16.0-megapixel resolution.

1.2 QUALITY ASSURANCE

- A. At the Site, ENGINEER or Resident Project Representative will indicate the views to be taken and will select time at which images will be taken. Photographic subjects, views, and angles will vary with progress of the Work.

1.3 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Pre-construction Photographic Documentation: Submit acceptable pre-construction photographic documentation (digital files) prior to mobilizing to and disturbing the Site. Submit pre-construction photographic documentation not later than the first Application for Payment, unless other schedule for pre-construction photographic documentation is accepted by ENGINEER.

2. Construction Progress Photographic Documentation: Submit acceptable construction progress photographic documentation (digital files) not less-often than monthly. Submit with each Application for Payment, unless otherwise agreed to by ENGINEER.

B. Closeout Submittals: Submit the following:

1. Final Photographic Documentation: Submit acceptable final photographic documentation (digital files) prior to requesting the final inspection by ENGINEER.

1.4 PHOTOGRAPHIC DOCUMENTATION – GENERAL

A. Digital Files of Photographs:

1. For each photograph taken, furnish high-quality digital image in “JPG” file format compatible with Microsoft Windows 7 and higher operating systems.
2. Image resolution shall be sufficient for clear, high-resolution prints. Minimum resolution shall be 150 dots per inch (dpi).
3. Do not imprint date and time in the image.
4. Electronic image filename shall describe the image; do not submit filenames automatically created by digital camera. For example, an acceptable electronic filename would be, “Dewatering Building – Looking West at Centrifuge No. 2.jpg”.
5. Form of Digital Submittal – Image File Upload:
 - a. Upload digital files of Project photographic documentation to the Project website
 - b. Upload files to new directory each time files are uploaded. Directory name shall be the date the photographs were taken (in the form of YEAR-MO-DAY), with brief general description of subject matter. Example: “2013-09-10 – Concrete Reinforcing in Slab”.

B. Videography:

1. Video shall be high-definition (HD), high-quality video of the Site and Project work.
2. All video files for the entire Project shall be submitted in one container file format. Video files shall be in one of the following container file formats:
 - a. AVI (Microsoft systems).
 - b. Flash Video (F4V, FLV; Adobe systems).
 - c. QuickTime File Format (MOV, QT; Apple, Inc.).

- d. MP4 (“MPEG-4 Part 14”).
- 3. Video image shall have imprinted date and time that video was taken.
- 4. Include audio narration sufficient to explain the scenes shown.
- 5. Form of Digital Submittal – Video File Upload:
 - a. Upload digital files of Project photographic documentation to the Project website
 - b. Upload files to new directory each time files are uploaded. Directory name shall be the date the video was taken (in the form of YEAR-MO-DAY), with brief general description of subject matter. Example: “2013-09-10 – Pouring Concrete Slab”.

1.5 PRE-CONSTRUCTION PHOTOGRAPHIC DOCUMENTATION

- A. Pre-construction Photographic Documentation:
 - 1. Obtain and submit sufficient pre-construction photographic documentation to record Site conditions prior to construction. Photographs shall document work areas of all prime contracts under the Project.
 - 2. Pre-construction photographs are not part of required number of construction progress photographs
 - 3. Furnish pre-construction video of all work areas included in all prime contracts on the Project, including indoor and outdoor work areas and staging areas.
- B. If disagreement arises on the condition of the Site and insufficient pre-construction photographic documentation was submitted prior to the disagreement, restore the grounds or area in question to extent directed by ENGINEER and to satisfaction of ENGINEER.

1.6 CONSTRUCTION PROGRESS PHOTOGRAPHIC DOCUMENTATION

- A. Progress Photographs:
 - 1. Take photographs not less often than twice per month.
 - 2. Take not less than five (5) photographs each time.
 - 3. Minimum number of progress photographs required will be fifteen (15), based on the Contract Times to Substantial Completion of the entire Project and scope of the Project on date the Contract Times commence running. Proportionately modify the extent of photographic documentation if scope of the Project or the Contract Times are modified.

Photographic Documentation

4. Obtain and submit interior and exterior photographic documentation of each structure in the work area as directed by ENGINEER at the time photographic documentation is taken.

1.7 FINAL PHOTOGRAPHIC DOCUMENTATION

A. Final Photographs:

1. Take photographs at time and day acceptable to ENGINEER. Do not take final photographs prior to Substantial Completion of the entire Project. Work documented in final photographs shall be generally complete, including painting and finishing, furnishings, landscaping, and other visible Work
2. Take not less than twenty five (25) final photographs, based on scope of the Project at the time that the Contract Times commence running. Proportionately modify the number of final photographs if scope of Project is modified. Final photographs are not part of construction progress photographs required under Paragraph 1.6.A of this Section.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

++ END OF SECTION ++

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall prepare and furnish submittals in accordance with the General Conditions, as may be modified by the Supplementary Conditions, and this Section.
2. Provide submittals well in advance of need for the material or equipment, or procedure (as applicable), in the Work and with ample time required for delivery of materials and equipment and to implement procedures following ENGINEER's approval or acceptance of the associated submittal. Work covered by a submittal will not be included in progress payments until approval or acceptance of related submittals has been obtained in accordance with the Contract Documents.
3. CONTRACTOR is responsible for dimensions to be confirmed and corrected at the Site; quantities; information pertaining solely to fabrication processes; means, methods, sequences, procedures, and techniques of construction; safety precautions and programs incident thereto; and for coordinating the work of all trades.
4. CONTRACTOR's signature of submittal's stamp and letter of transmittal shall be CONTRACTOR's representation that CONTRACTOR has complied with his obligations under the Contract Documents relative to that submittal. ENGINEER and OWNER shall be entitled to rely on such representations by CONTRACTOR.
5. Provisions of the general conditions, as may be modified by the supplementary conditions, apply to all contractor-furnished submittals required by the contract documents, regardless of whether such submittals are other than shop drawings or samples.

B. Samples:

1. Submittal of Samples shall comply with the General Conditions, as may be modified by the Supplementary Conditions, this Section, and the Specifications Section in which the Sample is specified.
2. Furnish at the same time those Samples and submittals that are related to the same element of the Work or Specifications Section. ENGINEER will not review submittals without associated

Samples, and will not review Samples without associated submittals.

3. Samples shall clearly illustrate functional characteristics of materials, all related parts and attachments, and full range of color, texture, pattern, and materials.

C. Restrictions on Quantity of Submittals and Compensation of OWNER:

1. CONTRACTOR shall furnish required submittals with sufficient information and accuracy to obtain required approval or acceptance of submittal by ENGINEER with not more than the number of resubmittals indicated in the General Conditions (as may be modified by the Supplementary Conditions).
2. Total number of CONTRACTOR's submittals shall not exceed 25 percent above the total number of first-time submittals indicated in the Schedule of Submittals initially accepted by ENGINEER. ENGINEER will record ENGINEER's time for reviewing submittals of Shop Drawings, Samples, and other submittals and items requiring approval or acceptance, beyond the quantity of first-time submittals indicated in the Schedule of Submittals initially accepted by ENGINEER, and CONTRACTOR shall reimburse OWNER for ENGINEER's charges for such time.
3. In the event that CONTRACTOR requests a substitution for a previously approved item, Contractor shall reimburse OWNER for ENGINEER's charges for such time unless the need for such substitution is beyond the control of CONTRACTOR.
4. OWNER may impose set-offs against CONTRACTOR for the costs for which CONTRACTOR is to reimburse or compensate OWNER, in accordance with the General Conditions.

1.2 TYPES OF SUBMITTALS

- A. Submittal types are classified as follows: 1) Action Submittals, 2) Informational Submittals, 3) Closeout Submittals, and 4) Maintenance Material submittals. Type of each required submittal is designated in the respective Specifications Sections; when type of submittal is not designated in the associated Specification Section, submittal will be classified as follows:

1. Action Submittals include:
 - a. Shop Drawings.
 - b. Product data.
 - c. Delegated design submittals, which include documents prepared, sealed, and signed by a design professional retained by CONTRACTOR, Subcontractor, or Supplier for materials and equipment to be incorporated into the

completed Work. Delegated design submittals do not include submittals related to temporary construction unless specified otherwise in the related Specifications Section. Delegated design submittals include: design drawings, design data including calculations, specifications, certifications, and other submittals prepared by such design professional.

- d. Samples.
- e. Testing plans, procedures, and testing limitations.
- 2. Informational Submittals include:
 - a. Certificates.
 - b. Design data not sealed and signed by a design professional retained by CONTRACTOR, Subcontractor, or Supplier.
 - c. Pre-construction test and evaluation reports, such as reports on pilot testing, subsurface investigations, testing for a potential Hazardous Environmental Condition, and similar reports.
 - d. Supplier instructions, including installation data, and instructions for handling, starting-up, and troubleshooting.
 - e. Source quality control submittals (other than testing plans, procedures, and testing limitations), including results of shop testing.
 - f. Field or Site quality control submittals (other than testing plans, procedures, and testing limitations), including results of operating and acceptability tests at the Site.
 - g. Supplier reports.
 - h. Sustainable design submittals (other than sustainable design closeout documentation).
 - i. Special procedure submittals, including plans for shutdowns and tie-ins and other procedural submittals.
 - j. Qualifications statements.
 - k. Administrative submittals including:
 - 1) Progress Schedules.
 - 2) Schedules of Submittals.
 - 3) Schedules of Values.
 - 4) Photographic documentation.
 - 5) Coordination drawings, when submittal of such is required.

- 6) Copies of permits obtained by CONTRACTOR.
 - 7) Field engineering reports, survey data, and similar information.
 3. Closeout Submittals include:
 - a. Maintenance contracts.
 - b. Operations and maintenance data.
 - c. Bonds, such as special maintenance bonds and bonds for a specific material, equipment item, or system.
 - d. Warranty documentation.
 - e. Record documentation.
 - f. Sustainable design closeout documentation.
 - g. Software.
 - h. Keying.
 4. Maintenance Material Submittals include:
 - a. Spare parts.
 - b. Extra stock materials.
 - c. Tools.
 5. When type of submittal is not specified and is not included in the list above, request an interpretation from ENGINEER and ENGINEER will determine the type of submittal.
- B. Fixed Asset Report Submittals
1. The contractor shall include with each month's pay application a Fixed Asset Report, which is used to officially document the installed inventory of equipment, certain material items, and the structure itself. The report is to be developed in a MS Excel spreadsheet format and will include components of each facility constructed, added, expanded, etc., on the facility site. As work is completed the report will expand, being a cumulative summary of the installed facility work. Pay applications will not be processed until an approved Fixed Asset Report is provided each month.
 2. The format and content of the report to be filled out by the Contractor is as follows:
 - a. Description: Description of the specific asset.
 - b. Quantity: The specific number of units installed.
 - c. Unit of Measurement: The method of determining the quantity (ex. Each, LF, CY, etc.).
 - d. Manufacturer Column: The name of the asset manufacturer.

- e. Serial Number: The specific serial number for the asset.
 - f. Values: The cost of the asset.
 - 3. At the conclusion of the project, the cumulative total of cost reported under the Fixed Asset Report will be the total contract value of the work.
 - 4. The report is to be submitted in both printed and electronic format.
- C. Sales Tax Report
- 1. To be included with each month's pay application is a Sales Tax Report, which is used to officially document the Georgia Sales Tax expended in the procurement of treatment equipment. All equipment purchased for installation under the contract will be documented within this report and will be accounted for by item cost and sales tax paid to the State of Georgia. The report is to be developed in a MS Excel spreadsheet format and will include each equipment item purchased, into which facility it is installed, the cost of the individual equipment item/component/system, and the corresponding tax paid on the individual equipment item/component/system. As work is completed or equipment received, the report will be expanded, being a cumulative summary of the treatment equipment installed at the facility.
 - 2. The format and content of the report is as follows:
 - a. The report is to be sorted by Area and Structure number in ascending order.
 - b. Column 1 - Labeled "Location": Identifies the location of the inventory included for that area of the facility. For this project, Location shall be designated as Crosstown WTP or South Fayette WTP
 - c. Column 2 - Labeled "Description": Identifies the specific item being documented. This is to include the structure/facility/building itself and all equipment items within the structure/facility/building or area (e.g. heating and ventilation equipment etc.), all system components (e.g. transformers, VFD, motor control centers, etc.) and all tagged/numbered/discretely identified items or components (e.g. valves, pumps, power panels, etc.).
 - d. Column 3 - Labeled "Manufacturer": Identifies the manufacturer of the specific item.
 - e. Column 4 - Labeled "Date of Sale": Identifies the date the invoice for the particular equipment item/component/system was paid.

- f. Column 5 - Labeled "Item Cost": Identifies the actual cost of the specific item prior to the application of sales tax.
 - g. Column 6 - Labeled "Sales Tax Paid": Identifies the actual Georgia Sales Tax paid for the specific item.
- 3. Each Structure and Area is to have a subtotal line wherein the individual items are summed to develop a Structure/Area value, and the Area subtotals are summed to establish a total Georgia Sales Tax value paid
- 4. The monthly reports shall be accompanied by certified copies of invoices showing the items costs and taxes paid and a copy of the checks used for payment.
- 5. The report is to be submitted in both printed and electronic format.
- D. Not Included in this Section: Administrative and procedural requirements for following are covered elsewhere in the Contract Documents:
 - 1. Requests for interpretations of the Contract Documents.
 - 2. Change Orders, Work Change Directives, and Field Orders.
 - 3. Applications for Payment
 - 4. Reports, documentation, and permit applications required to be furnished by CONTRACTOR to authorities having jurisdiction.

1.3 REQUIREMENTS FOR SCHEDULE OF SUBMITTALS

- A. Informational Submittals: Submit the following:
 - 1. Schedule of Submittals:
 - a. Timing:
 - 1) Furnish submittal within time frames indicated in the Contract Documents.
 - 2) Submit updated Schedule of Submittals with each submittal of the updated Progress Schedule.
 - b. Content: In accordance with the General Conditions, as may be modified by the Supplementary Conditions, and this Section. Requirements for content of preliminary Schedule of Submittals and subsequent submittals of the Schedule of Submittals are identical. Identify on Schedule of Submittals all submittals required in the Contract Documents. Updates of Schedule of Submittals shall show scheduled dates and actual dates for completed tasks. Indicate submittals that are on the Project's critical path. Indicate the following for each submittal:

- 1) Date by which submittal will be received by ENGINEER.
 - 2) Whether submittal will be for a substitution or “or-equal”. Procedures for requesting approval of substitutes and “or-equals” are specified in the General Conditions, Section 01 33 00, Substitution Procedures,
 - 3) Date by which ENGINEER’s response is required. Not less than 14 days shall be allowed for ENGINEER’s review, starting upon ENGINEER’s actual receipt of each submittal. Allow increased time for large or complex submittals.
 - 4) For submittals for materials or equipment, date by which material or equipment must be at the Site to avoid delaying the Work and to avoid delaying the work of other contractors, if any.
- c. Prepare Schedule of Submittals using same software, and in same format, specified for Progress Schedules in Section 01 32 16, Progress Schedule.
- d. Coordinate Schedule of Submittals with the Progress Schedule.
- e. Schedule of Submittals that is not compatible with the Progress Schedule, or that does not indicate submittals on the Project’s critical path, or that that places extraordinary demands on ENGINEER for time and resources, is unacceptable. Do not include submittals not required by the Contract Documents.
- f. In preparing Schedule of Submittals:
- 1) Considering the nature and complexity of each submittal, allow sufficient time for review and revision.
 - 2) Reasonable time shall be allowed for: ENGINEER’s review and processing of submittals, for submittals to be revised and resubmitted, and for returning submittals to CONTRACTOR.
 - 3) Identify and accordingly schedule submittals that are expected to have long anticipated review times.

1.4 PROCEDURE FOR SUBMITTALS

- B. Submittal Identification System: Use the following submittal identification system, consisting of submittal number and review cycle number.

1. Submittal Number: Shall be separate and unique number correlating to each individual submittal required. Assign submittal numbers as follows:
 - a. First part of submittal number shall be the applicable Specifications Section number, followed by a hyphen.
 - b. Second part of submittal number shall be a three-digit number (sequentially numbered from 001 through 999) assigned to each separate and unique submittal furnished under the associated Specifications Section.
 - c. Typical submittal number for the third submittal furnished for Section 40 05 53, Process Valves, would be “40 05 53-003”.
2. Review Cycle Number: Shall be a letter designation indicating the initial submittal or re-submittal associated with each submittal number:
 - a. “A” = Initial (first) submittal.
 - b. “B” = Second submittal (e.g., first re-submittal).
 - c. “C” = Third submittal (e.g., second re-submittal).
3. Examples:

Example Description	Submittal Identification	
	Submittal No.	Review Cycle
Initial (first) review cycle of the third submittal provided under Section 40 05 53, Process Valves	40 05 53-003-	A
Second review cycle (first re-submittal) of third submittal provided under Section 40 05 53, Process Valves	40 05 53-003-	B

C. Letter of Transmittal for Submittals:

1. Furnish separate letter of transmittal with each submittal. Each submittal shall be for one Specifications Section.
2. At beginning of each letter of transmittal, include a reference heading indicating: CONTRACTOR’s name, OWNER’s name, Project name, Contract designation, transmittal number, and submittal number.
3. For submittals with proposed deviations from requirements of the Contract Documents, letter of transmittal shall specifically describe each proposed variation.

D. Contractor's Review and Stamp:

1. Contractor's Review: Before transmitting submittals to ENGINEER, review submittals to:
 - a. Ensure proper coordination of the Work;
 - b. Determine that each submittal is in accordance with CONTRACTOR's desires;
 - c. Verify that submittal contains sufficient information for ENGINEER to determine compliance with the Contract Documents.
2. Incomplete or inadequate submittals will be returned without review.
3. Contractor's Stamp and Signature:
 - a. Each submittal furnished shall bear CONTRACTOR's stamp of approval and signature, as evidence that submittal has been reviewed by CONTRACTOR and verified as complete and in accordance with the Contract Documents.
 - b. Submittals without CONTRACTOR's stamp and signature will be returned without review. Signatures that appear to be computer-generated will be regarded as unsigned and the associated submittal will be returned without review.
 - c. CONTRACTOR's stamp shall contain the following:

"Project Name: _____
 Contractor's Name: _____
 Contract Designation: _____
 Date: _____

----- Reference -----

Submittal Title: _____
 Specifications: _____
 Section: _____
 Page No.: _____
 Paragraph No.: _____
 Drawing No.: _____ of _____
 Location of Work: _____

Submittal No. and Review Cycle: _____
 Coordinated by Contractor with Submittal Nos.: _____

I hereby certify that the Contractor has satisfied Contractor's obligations under the Contract Documents relative to Contractor's review and approval of this submittal.

Approved for Contractor by: _____”

E. Submittal Marking and Organization:

1. Mark on each page of submittal and each individual component submitted with submittal number and applicable Specifications paragraph. Mark each page of each submittal with the submittal page number.
2. Arrange submittal information in same order as requirements are written in the associated Specifications Section.
3. Each Shop Drawing sheet shall have title block with complete identifying information satisfactory to ENGINEER.
4. Package together submittals for the same Specifications Section. Do not furnish required information piecemeal.

F. Format of Submittal and Recipients:

1. Action Submittals and Informational Submittals: Furnish in accordance with Table 01 33 00-A, except that submittals of Samples shall be as specified elsewhere in this Section:

**TABLE 01 33 00-A: SUBMITTAL CONTACTS
AND REQUIRED FORMAT**

	Address for Deliveries	Contact Person	E-mail Address	Format*	No. of Printed Copies
a.	Engineer: ARADIS U.S., Inc., 2839 Paces Ferry Road Suite 1000 Atlanta GA	TBD	TBD@Arcadis.com	E	Zero
b.	Owner: Fayette County Water System 245 McDonough Rd, Fayetteville, GA 30214	TBD	TBD	E	Zero
* Format: E = Electronic files; P = Printed copies. TBD = To Be Determined					

2. Samples:

- a. Securely label or tag Samples with submittal identification number. Label or tag shall include clear space at least four inches by four inches in size for affixing ENGINEER’s review stamp. Label or tag shall not cover, conceal, or alter

appearance or features of Sample. Label or tag shall not be separated from the Sample.

- b. Submit quantity of Samples required in Specifications. If quantity of Samples is not indicated in the associated Specifications Section, furnish not less than two identical Samples of each item required for ENGINEER's approval. Samples will not be returned to CONTRACTOR. If CONTRACTOR requires Sample(s) for CONTRACTOR's use, so advise ENGINEER in writing and furnish additional Sample(s). CONTRACTOR is responsible for furnishing, shipping, and transporting additional Samples.
- c. Deliver one Sample to ENGINEER's field office at the Site. Deliver balance of Samples to ENGINEER at address indicated in Table 01 33 00-A, unless otherwise directed by ENGINEER.

3. Closeout Submittals:

- a. Furnish the following Closeout Submittals in accordance with Table 01 33 00-A: maintenance contracts; bonds for specific materials, equipment, or systems; warranty documentation; and sustainable design closeout documentation. On documents such as maintenance contracts and bonds, include on each document furnished original ("wet") signature of entity issuing said document. When original "wet" signatures are required, furnish such submittals in printed form and electronic form to ENGINEER, and to other entities furnish as indicated in Table 01 33 00-A.
- b. Operations and Maintenance Data: Submit in accordance with Section 01 78 23, Operation and Maintenance Data.
- c. Record Documentation: Submit in accordance with Section 01 78 39, Project Record Documentation.
- d. Software: Submit number of copies required in Specifications Section where the software is specified. If number of copies is not specified, provide two copies on compact disc in addition to software loaded on OWNER's computer(s) or microprocessor(s).

4. Maintenance Material Submittals: For spare parts, extra stock materials, and tools, furnish quantity of items specified in associated Specifications Section.

G. Electronic Submittals:

- 1. Format: Electronic files shall be in "portable document format" (.PDF). Files shall be electronically searchable.

2. Organization and Content:
 - a. Each electronic submittal shall be one file; do not divide individual submittals into multiple files each.
 - b. When submittal is large or contains multiple parts, furnish PDF file with bookmark for each section of submittal.
 - c. Content shall be identical to printed submittal. First page of electronic submittal shall be CONTRACTOR's letter of transmittal.
3. Quality and Legibility: Electronic submittal files shall be made from the original and shall be clear and legible. Do not submit scans of faxed copies. Electronic file shall be full size of original, printed documents. Properly orient all pages for reading on a computer screen.
4. Provide sufficient Internet service and e-mail capability for CONTRACTOR's use in transferring electronic submittals, receiving responses to electronic submittals, and associated electronic correspondence. Check not less than once per day for distribution of electronic submittals, electronic responses of submittal, and electronic correspondence related to submittals.
5. Submitting Electronic Files:
 - a. Transmit electronic files in accordance with Section 01 31 26, Electronic Communication Protocols.

H. Distribution:

1. Distribution of ENGINEER's Response via Electronic Files: Upon completion of ENGINEER's review, electronic submittal response will be distributed by ENGINEER to
 - a. CONTRACTOR.
 - b. OWNER.
 - c. ENGINEER's file.
- I. Resubmittals: Refer to the General Conditions for requirements regarding resubmitting required submittals.

1.5 ENGINEER'S REVIEW

- A. Timing: ENGINEER's review will conform with timing indicated in the Schedule of Submittals accepted by ENGINEER.
- B. Submittals not required by the Contract Documents will not be reviewed by ENGINEER and will not be recorded in ENGINEER's submittal log. All printed copies of such submittals will be returned to CONTRACTOR. Electronic copies of such submittals, if any, will not be retained by ENGINEER.

- C. Action Submittals, Results of ENGINEER's Review: Each submittal will be given one of the following dispositions by ENGINEER:
1. Approved: Upon return of submittal marked "Approved", order, ship, or fabricate materials and equipment included in the submittal (pending ENGINEER's approval or acceptance, as applicable, of source quality control submittals) or otherwise proceed with the Work in accordance with the submittal and the Contract Documents.
 2. Approved as Corrected: Upon return of submittal marked "Approved as Corrected", order, ship, or fabricate materials and equipment included in the submittal (pending ENGINEER's approval or acceptance, as applicable, of source quality control submittals) or otherwise proceed with the Work in accordance with the submittal and the Contract Documents, and in accordance with the corrections indicated in the ENGINEER's submittal response.
 3. Approved as Corrected – Resubmit: Upon return of submittal marked "Approved as Corrected – Resubmit", order, ship, or fabricate materials and equipment included in the submittal (pending ENGINEER's approval or acceptance, as applicable, of source quality control submittals) or otherwise proceed with the Work in accordance with the submittal and the Contract Documents, and in accordance with corrections indicated in ENGINEER's submittal response. Furnish to ENGINEER record re-submittal with all corrections made. Receipt of corrected re-submittal is required before materials or equipment covered in the submittal will be eligible for payment.
 4. Revise and Resubmit: Upon return of submittal marked "Revise and Resubmit", make the corrections indicated and re-submit to ENGINEER for approval.
 5. Not Approved: This disposition indicates material or equipment that cannot be approved. "Not Approved" disposition may also be applied to submittals that are incomplete. Upon return of submittal marked "Not Approved", repeat initial submittal procedure utilizing approvable material or equipment, with a complete submittal clearly indicating all information required.
- D. Informational Submittals, Results of ENGINEER's Review:
1. Each submittal will be given one of the following dispositions:
 - a. Accepted: Information included in submittal complies with the applicable requirements of the Contract Documents, and is acceptable. No further action by CONTRACTOR is required relative to this submittal, and the Work covered by the submittal may proceed, and materials and equipment

with submittals with this disposition may be shipped or operated, as applicable.

- b. Not Accepted: Submittal does not indicate compliance with applicable requirements of the Contract Documents and is not acceptable. Revise submittal and re-submit to indicate acceptability and compliance with the Contract Documents.
- 2. The following types of Informational Submittals, when acceptable to ENGINEER, will not receive a written response from ENGINEER. Disposition as “accepted” will be recorded in ENGINEER’s submittal log. When submittals of the following are not acceptable, ENGINEER will provide written response to CONTRACTOR
 - a. Material safety data sheets (MSDS).
 - b. Compaction testing reports.
 - c. Concrete testing reports.
 - d. Manufacturer’s instructions.
- E. Closeout Submittals, Results of ENGINEER’s Review: Dispositions and meanings are the same as specified for Informational Submittals. When acceptable, Closeout Submittals will not receive a written response from ENGINEER. Disposition as “accepted” will be recorded in ENGINEER’s submittal log. When Closeout Submittal is not acceptable, ENGINEER will provide written response to CONTRACTOR.
- F. Maintenance Material Submittals, Results of ENGINEER’s Review: Dispositions and meanings are the same as specified for Informational Submittals. When acceptable, Maintenance Material Submittals will not receive a written response from ENGINEER. Disposition as “accepted” will be recorded in ENGINEER’s submittal log. When Maintenance Material Submittal is not acceptable, ENGINEER will provide written response to CONTRACTOR, and CONTRACTOR is responsible for costs associated with transporting and handling of maintenance materials until compliance with the Contract Documents is achieved.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

3.1 ATTACHMENTS

- A. The documents listed below, and attached following this Section’s “End of Section” designation, are part of this Specification Section.
 - 1. Example Fixed Asset Report Form (one page).
 - 2. Example Sales Tax Report Form (one page).

++ END OF SECTION ++

Example Fixed Asset Report Form

Asset Class	Description	Asset Main No Text	Account Determination	Inventory Number	Quantity	Unit of Measure	Inventory Note	Cost Center	Plant	Location	Fund
14500402	Generator				1	Each		1912006 0100		Ambercrest PS	504
14500402	Generator				1	Each		1912006 0100		Centerville PS	504
14500402	Generator				1	Each		1912006 0100		M & M Killian Hill PS	504
14500402	Generator				1	Each		1912006 0100		Magnolia Walk PS	504
14500402	Generator				1	Each		1912006 0100		Ridge Road PS	504
14500402	Generator				1	Each		1912006 0100		Sagamore Hills PS	504
14500402	Generator				1	Each		1912006 0100		Suwanee CK PS	504
14500402	Automatic Transfer Switch				1	Each		1912006 0100		Northforke Peachtree CK PS	504
14500402	Automatic Transfer Switch				1	Each		1912006 0100		Ambercrest PS	504
14500402	Automatic Transfer Switch				1	Each		1912006 0100		Centerville PS	504
14500402	Automatic Transfer Switch				1	Each		1912006 0100		M & M Killian Hill PS	504
14500402	Automatic Transfer Switch				1	Each		1912006 0100		Magnolia Walk PS	504
14500402	Automatic Transfer Switch				1	Each		1912006 0100		Ridge Road PS	504
14500402	Automatic Transfer Switch				1	Each		1912006 0100		Sagamore Hills PS	504
14500402	Controller				1	Each		1912006 0100		Northforke Peachtree CK PS	504
14500103	site work							1912006 0100			504

Vendor	Manufacturer	Acquisition Method	Funding Source	WBS Element	Useful Life	Additional Text	Serial Number	Value
	Kohler			M0745-14-3-03	20		2009785	14700
	Cummins Onan			M0745-14-3-03	20		I120394426	17000
	Kohler			M0745-14-3-03	20		2009782	14700
	Cummins Onan			M0745-14-3-03	20		H030530100	15000
	Cummins Onan			M0745-14-3-03	20		L010311595	15500
	Kohler			M0745-14-3-03	20		2009758	14700
	Cummins Onan			M0745-14-3-03	20		A130441477	322000
	Cummins Onan			M0745-14-3-03	20		A130440437	170000
	Asco			M0745-14-3-03	20		8852700010E	6300
	Cummins Onan			M0745-14-3-03	20		I120391809	4000
	Asco			M0745-14-3-03	20		885271RE	6300
	Asco			M0745-14-3-03	20		885273RE	6000
	Asco			M0745-14-3-03	20		893740RE	6500
	Asco			M0745-14-3-03	20		885270002RE	6300
	Cummins Onan			M0745-14-3-03	20		1097	23106.14
				M0745-14-3-03				549791.6

Example Sales Tax Report Form

Item No.	Equipment or machinery	Function	Cost	Sales tax paid	Date paid	Pay Request No.
1	Frames	Cover for valve vault. Valves are an integral part of process piping used in the sprayfields.	\$1,914.00	\$114.84	11/19/1998	2
2	Reinforcing Steel	Used in construction of the irrigation pump station. This pump station pumps wastewater to the sprayfields for land treatment.	\$4,590.00	\$275.40	11/19/1998	2
3	PVC pipe and fittings	Onsite process piping. Piping is an integral part of the treatment process - it conveys wastewater from pump station to sprayfields.	\$23,780.00	\$1,426.80	11/19/1998	2
4	PVC pipe and fittings	Onsite process piping	\$7,354.80	\$441.29	11/19/1998	2
5	PVC pipe and fittings	Onsite process piping	\$10,613.60	\$636.82	11/19/1998	2
6	PVC pipe and fittings	Onsite process piping	\$12,077.20	\$724.63	11/19/1998	2
7	PVC pipe and fittings	Onsite process piping	\$31,223.60	\$1,873.42	11/19/1998	2
8	PVC pipe and fittings	Onsite process piping	\$13,190.40	\$791.42	11/19/1998	2
9	PVC pipe and fittings	Onsite process piping	\$39,672.78	\$2,380.37	11/19/1998	2
10	PVC pipe and fittings	Onsite process piping	\$11,688.80	\$701.33	11/19/1998	2
11	PVC pipe and fittings	Onsite process piping	\$4,477.20	\$268.63	11/19/1998	2
12	PVC pipe and fittings	Onsite process piping	\$7,844.00	\$470.64	11/19/1998	2
13	PVC pipe and fittings	Onsite process piping	\$1,517.40	\$91.04	11/19/1998	2
14	PVC pipe and fittings	Onsite process piping	\$13,190.40	\$791.42	11/19/1998	2
15	Ductile iron pipe and fittings	Onsite process piping	\$32,036.99	\$1,922.22	11/19/1998	2
16	Ductile iron pipe and fittings	Onsite process piping	\$244.26	\$14.66	11/19/1998	2
17	Ductile iron pipe and fittings	Onsite process piping	\$21,760.74	\$1,305.64	11/19/1998	2
18	Ductile iron pipe and fittings	Onsite process piping	\$2,228.21	\$133.69	11/19/1998	2
19	Ductile iron pipe and fittings	Onsite process piping	\$98,561.36	\$5,913.68	11/19/1998	2
20	Flange Bolt Sets	Onsite process piping	\$504.68	\$30.28	11/19/1998	2
21	Drain Valves	Onsite process piping - drain valves prevent freezing damage to sprinkler risers.	\$2,424.40	\$145.46	11/19/1998	2
22	Sprinklers	Onsite process piping - sprinklers irrigate wastewater on forested land for treatment.	\$51,228.40	\$3,073.70	11/19/1998	2
23	Screen	Used in the irrigation pump station to prevent clogging of sprinklers.	\$1,970.00	\$118.20	12/18/1998	3
24	Misc. metals	Onsite process piping - hatch for valve vault	\$1,565.00	\$93.90	12/18/1998	3
25	Misc. metals	Used in construction of the wastewater treatment operations bldg.	\$1,937.00	\$116.22	12/18/1998	3
26	Sprinklers	Onsite process piping - sprinklers irrigate wastewater on forested land for treatment.	\$1,213.44	\$72.81	12/18/1998	3
27	Brass adapters	Onsite process piping - adapter from ball valve to sprinkler on spray sprinkler risers	\$11,151.00	\$669.06	12/18/1998	3
28	Brass adapters	Onsite process piping - adapter from ball valve to sprinkler on spray sprinkler risers	\$2,124.00	\$127.44	12/18/1998	3
29	Tapping Saddles	Onsite process piping	\$5,572.63	\$334.36	12/18/1998	3
30	Gate Valves	Onsite process piping - sprayfield isolation valves	\$6,221.43	\$373.29	12/18/1998	3
31	Flange Bolt Sets	Onsite process piping - sprayfield isolation valves	\$292.68	\$17.56	12/18/1998	3
32	Ductile iron pipe and fittings	Onsite process piping	\$2,777.03	\$166.62	12/18/1998	3

SECTION 01 35 23

SAFETY REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Scope:
 - 1. This Section augments the requirements elsewhere in the Contract Documents regarding CONTRACTOR's responsibilities for safety and protection and includes requirements for CONTRACTOR's safety representative and other safety requirements applicable to the Project.
 - 2. CONTRACTOR shall provide labor, materials, tools, equipment, training, certifications, protective measures, and incidentals shown, specified, and required to comply with CONTRACTOR's obligations under the Contract for safety and protection of personnel and property.
- B. Related sections: provisions of this section are coordinated with, but are not limited to, the following:
 - 1. Section 01 51 05, Temporary Facilities.
 - 2. Section 01 71 33, Protection of the Work and Property.

1.2 QUALITY ASSURANCE

- A. Qualifications:
 - 1. CONTRACTOR's Safety Representative:
 - a. ENGINEER's acceptance of CONTRACTOR's safety representative's qualifications does not in any way mitigate or relieve CONTRACTOR of CONTRACTOR's safety obligations under the Contract Documents.
 - b. CONTRACTOR's safety representative shall possess not less than five years of experience serving as the safety representative on projects similar to or larger in size than this Contract, and for type(s) of construction similar in nature to the Work.
 - c. CONTRACTOR's safety representative shall be experienced in the types of Work to be performed under the Contract and shall be experienced with safety precautions, procedures, and equipment appropriate for the safe performance of the Work.
 - d. Prior to the Effective Date of the Contract, shall have successfully completed a 30-hour OSHA Construction Safety and Health training course, and a 40-hour OSHA Hazardous Materials training course, and training for confined space entry.

- e. CONTRACTOR's safety representative shall be completely experienced with and knowledgeable of all applicable health and safety Laws and Regulations and with good safety practices and shall ensure compliance with such Laws and Regulations and practices at the Site.
- f. Minimum responsibilities of CONTRACTOR's safety representative are indicated in this Section.

B. Regulatory Requirements:

- 1. Conform to safety provisions to the Federal and State Department of Labor Occupational Safety and Health Act (OSH Act), and all other applicable federal, state, county, and local laws, ordinances, codes, the requirements set forth herein, and any regulations that may be specified elsewhere in these Contract Documents.
- 2. Comply with Safety and Health Regulations for Construction, promulgated by the Secretary of Labor under Section 107 of the Contract Work Hours and Safety Standards Act, as set forth in Title 29, CFR and all other laws, codes, and standards that apply.
- 3. The Contractor's failure to thoroughly familiarize himself with the safety provisions shall not relieve him from compliance with the obligations or relieve him of the penalties set forth therein.

1.3 SUBMITTALS

A. Informational submittals: submit the following:

- 1. Emergency contact information, in accordance with Article 0 of this Section.
- 2. Citations:
 - a. Copies of safety citations from authorities having jurisdiction and insurance companies, submitted within 24 hours of CONTRACTOR's receipt of such citations.
- 3. Qualifications Statements:
 - a. CONTRACTOR's Safety Representative: Submit name and qualifications of CONTRACTOR's safety representative, including summary of experience, and training received and valid certifications and accreditations applicable to the Project.

1.4 SAFETY REPRESENTATIVE RESPONSIBILITIES

A. General:

- 1. CONTRACTOR's safety representative shall have appropriate space at the Site to maintain and keep available safety records, up-to-date copies of pertinent safety Laws and Regulations, Material Data Sheets, CONTRACTOR's site-specific health and safety plan, copies of

OWNER's health and safety requirements with which CONTRACTOR shall comply, and the Site safety plan including information concerning foreseeable emergency conditions, and emergency contact information as required in Article 1.5 of this Section.

B. CONTRACTOR'S safety representative's responsibilities include:

1. Duties and responsibilities in accordance with the General Conditions.
2. CONTRACTOR's safety representative shall coordinate with CONTRACTOR's "competent person" required under Laws and Regulations.
3. CONTRACTOR's safety representative shall attend progress meetings in accordance with Section 01 31 19, Progress Meetings.
4. Schedule and conduct safety meetings and safety training programs as required by Laws and Regulations, CONTRACTOR's Site-specific health and safety plan (SSHASP), and good safety practices. Include in the SSHASP a specific schedule (dates) of such meetings and an outline of materials to be covered. Advise ENGINEER prior to the time and place of such meetings. Invite OWNER's personnel to meetings. Instruct CONTRACTOR's employees (and Subcontractors, Suppliers with personnel at the Site, and others for whom CONTRACTOR is responsible) on recognition of hazards, observance of precautions, of the contents of the SSHASP and other safety programs with which CONTRACTOR shall comply, and use of personal protective equipment (PPE) and safety equipment.
5. Determine that operators of specific construction equipment (and permanent equipment used for construction operations) are qualified by training and experience before such personnel are allowed to operate such equipment.
6. Develop and implement emergency response procedures, including names, locations, and contact telephone numbers for emergency services and medical assistance as indicated in requirements for the emergency contact list in Article 1.5 of this Section.
7. Post appropriate notices regarding health and safety Laws and Regulations at locations at the Site and CONTRACTOR's office that afford maximum exposure to personnel.
8. Post appropriate instructions and warning signs in regard to all hazardous areas and hazardous conditions that cannot be eliminated. Identification of such areas shall be based on experience, site surveillance, and severity of the associated hazard. Signage shall not be used in place of appropriate workplace controls.
9. Ascertain via personal inspection that safety Laws and Regulations and safety program requirements are enforced. Make inspections at appropriate frequencies to ensure that machines, tools, and equipment are

in a safe operating condition; and that all work areas are free of hazards to the extent practicable. Implement necessary and timely corrective actions to eliminate unsafe acts and unsafe conditions and submit to ARCADIS daily copy of findings resulting from inspection, using inspection checklist forms established in CONTRACTOR's SSHASP.

10. Submit to ENGINEER copies of safety citations from authorities having jurisdiction and insurance companies within 24 hours of CONTRACTOR's receipt of such citations.
11. Provide appropriate orientation to employees, visitors, Subcontractors, and Supplier personnel at the Site.
12. Perform all related tasks necessary to achieve the highest degree of safety that the nature of the Work allows.

1.5 EMERGENCY CONTACT INFORMATION

- A. CONTRACTOR shall submit list of emergency contact information for 24-hour use throughout the Project. Emergency contact information shall be updated and kept current throughout the Project. If personnel or contact information change, furnish updated emergency contact information list at the next progress meeting.
- B. CONTRACTOR's list of emergency contact information shall include:
 1. CONTRACTOR's project manager's office, field office, and cellular telephone numbers.
 2. CONTRACTOR's Site superintendent's office, field office, and cellular telephone numbers.
 3. CONTRACTOR's foreman's field office and cellular telephone numbers.
 4. CONTRACTOR's safety representative's office and cellular telephone numbers.
 5. Major Subcontractors' and Suppliers' office and cellular telephone numbers of project manager and foreman (when applicable).
- C. Additional emergency contact information:
 1. OWNER's project manager: office and cellular, telephone numbers.
 2. OWNER's central 24-hour emergency telephone number.
 3. ENGINEER's project manager's office and cellular telephone numbers.
 4. ENGINEER's project engineer's office and cellular telephone numbers.
 5. Resident Project Representative's office, field office and cellular telephone numbers.
 6. Utility companies' 24-hour contact telephone number(s), including gas, water, sewer, and other companies or concerns having utilities in the vicinity of the Work.

7. Highway and street owners' 24-hour telephone number(s).
8. Emergency telephone numbers, including: "Emergency: Dial 911", and seven-digit telephone numbers for the hospital, ambulance, police, and fire department nearest to the Site. Furnish names of each of these institutions.
9. Other involved entities as applicable.
10. Include with list of emergency contact information an 8.5-inch by 11-inch map showing route from the Sites to the nearest hospitals.

1.6 SAFETY EQUIPMENT

A. General:

1. CONTRACTOR shall provide proper safety and rescue equipment, adequately maintained and readily available, for any foreseeable contingency.
2. Such equipment shall include items such as safety ropes and harnesses, fall-prevention devices, stretchers, water safety devices, oxygen breathing apparatus, resuscitators, gas detectors, oxygen deficiency indicators, combustible gas detectors, fire extinguishers and first-aid equipment in accordance with the Division 01 Specifications, and similar equipment as appropriate.
3. Keep safety equipment in protected areas. Check safety equipment at scheduled intervals.
4. Temporary First-Aid Facilities: Provide and maintain in accordance with Section 01 51 05, Temporary Facilities.

B. Safety Equipment Log:

1. Maintain a log indicating the person who checked the equipment, when equipment was checked, and that equipment was acceptable.
2. Update equipment log not less-often than monthly.
3. Include in safety representative's onsite records copies of equipment calibration records.

C. Provide replacement safety equipment when primary safety equipment is unavailable due to use or when undergoing maintenance.

D. Personal Protective Equipment (PPE):

1. All persons entering the work areas shall wear appropriate PPE required for the particular area.
2. Remove from the Site any person failing to comply with this or any other safety requirement.
3. Continuously provide all necessary PPE for ENGINEER's employees, Resident Project Representative, and consultants. ENGINEER will furnish for ENGINEER's employees and consultants' protective helmets

(hard hats), safety eyewear, reflective vests, and hearing protection.
CONTRACTOR shall furnish other equipment required.

1.7 EVACUATION DRILL

- A. Included in CONTRACTOR's SSHASP shall be evacuation drills, conducted not less-often than once every six months, held in coordination with existing facility's alarm signal under the control of OWNER's facility manager.
- B. Perform evacuation drill during regular working hours, scheduled to minimize disruption of the Work.
- C. Upon evacuation, CONTRACTOR and all personnel for whom CONTRACTOR is responsible, immediately advise ENGINEER's onsite personnel and OWNER's facility manager that all personnel have been evacuated.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 41 24

PERMIT REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes general requirements relative to permitting requirements of which OWNER and ENGINEER are aware that apply to the Project.
2. CONTRACTOR shall provide labor, materials, equipment, tools, and incidentals shown, specified, and required to obtain required permits and comply with required permits and licenses.
3. Obtain, pay for, and comply with required permits and licenses whether or not indicated in this Section or elsewhere in the Contract Documents.

B. Coordination:

1. Coordinate compliance with permit and license requirements with Work under other Sections and with other contractors, if any, working at the Site.
2. Coordinate with the Progress Schedule the time required to apply for and obtain required permits and licenses. Changes in Contract Times or Contract Price will not be authorized because of timing and costs associated with obtaining permits and licenses required for the Work.

1.2 MUNICIPAL PERMITS AND LICENSES

A. The anticipated necessary permits listed are the responsibility of the Owner and their status is as follows.:

1. Building Permit will be acquired by the Owner through Fayette County Department of Planning and Development and will be provided to the CONTRACTOR.
2. Fees for Building Permit, if necessary, are paid for by the OWNER, upon acquisition of the permit.
3. Land disturbance permit will be acquired by the Owner through the City of Fayetteville Planning and Development and will be provided to the CONTRACTOR.
4. Fees for the Land Disturbance Permit, if necessary, are paid for by the CONTRACTOR, upon acquisition of the permit.

B. Licenses:

1. Municipal licenses are not required for the Work under this Project.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 42 00

REFERENCES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Section includes the following:
 - a. Definitions and terminology in general use in the Contract Documents.
 - b. Applicable codes.
 - c. Abbreviations in general use throughout the Contract Documents.
 - d. General requirements regarding reference standards, including a listing of standard-issuing organizations (and their acronyms) used in the Contract Documents.

1.2 DEFINITIONS AND TERMINOLOGY

- A. Definitions and terminology applicable to all the contract documents are included in the general conditions, as may be modified by the supplementary conditions.
- B. Additional terminology used in the Contract Documents includes the following:
 1. “Indicated” refers to graphic representations, notes, or schedules on the Drawings, or to other paragraphs, provisions, tables, or schedules in the Specifications and similar locations in the other Contract Documents. Terminology such as “shown”, “noted”, “scheduled”, and “specified” are used to help the user locate the reference without limitation on the location.
 2. “Installer”, “applicator”, or “erector” is CONTRACTOR or another person or entity engaged by CONTRACTOR, either as an employee or Subcontractor, to perform a particular construction activity, including installation, erection, application, or similar Work. Installers shall be experienced in the Work that installer is engaged to perform.
 - a. The term “experienced”, when used in conjunction with the term “installer”, means having successfully completed not less than five previous projects similar in size and scope to this Project; being familiar with the special requirements indicated and required; being familiar with Laws and Regulations; and having complied with requirements of

authorities having jurisdiction, and complying with requirements of the Supplier of the material or equipment being installed, unless other experience requirements specific to that element of the Work are indicated elsewhere in the Contract Documents.

3. Trades: Use of terms such as “carpentry” does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as “carpenter”, unless otherwise indicated in the Contract Documents or required by Laws or Regulations. Such terminology also does not imply that specified requirements apply exclusively to trade personnel of the corresponding generic name.

1.3 APPLICABLE CODES

- A. References in the Contract Documents to local code(s) shall mean the following:
 1. National Electric Code 2023 edition as adopted by Georgia
 2. NFPA 101, Life Safety Code.

1.4 ABBREVIATIONS

- A. Common abbreviations that may be found in the Contract Documents are indicated below, alphabetically by their written-out meaning:

alternating current	a-c
ampere	A
antemeridian	a.m.
Architectural Barriers Act	ABA
Americans with Disabilities Act	ADA
Americans with Disabilities Act Accessibility Guidelines	ADAAG
average	avg
biochemical oxygen demand	BOD
five-day biochemical oxygen demand	BOD5
brake horsepower	bhp
British thermal unit	Btu
building information model	BIM
carbonaceous biochemical oxygen demand	CBOD
five-day carbonaceous biochemical oxygen demand	CBOD5
chemical oxygen demand	COD
Centigrade (or Celsius)	C

chlorinated polyvinyl chloride	CPVC
chlorofluorocarbons	CFC
Code of Federal Regulations	CFR
computer-aided drafting and design	CADD, or CAD
cubic inch	cu in
cubic foot	cu ft
cubic yard	cu yd, or CY
cubic feet per minute	cfm
cubic feet per second	cfs
decibel	db
degree Centigrade (or Celsius) (Write)	degrees C, oC, or deg C
degrees Fahrenheit	degrees F, oF, or deg F
diameter	dia
direct current	d-c
dollars	\$
each	ea
efficiency	eff
Fahrenheit	F
feet	ft
feet per hour	fph, or ft/hr
feet per minute	fpm
feet per second	fps, or ft/min
figure	fig
flange	flg
foot-pound	ft-lb
gallon	gal
gallons per hour	gph, or gal/hr
gallons per minute	gpm
gallons per second	gps
gram	g
grams per liter	g/L
Hertz	Hz
horsepower	hp or HP
hour	hr
human-machine interface	HMI
inch	in.
inches of mercury	in. Hg
inches water gage	in. w.g.
inch-pound	in.-lb
inside diameter	ID

iron pipe size	IPS
thousand pounds	kips
thousand pounds per square inch	ksi
kilovolt-ampere	kva
kilowatt	kw
kilowatt-hour	kwhr or kwh
linear foot	lin ft or LF
liter	L
Leadership in Energy and Environmental Design (USGBC)	LEED
maximum	max
mercury	Hg
milligram	mg
milligrams per liter	mg/l or mg/L
milliliter	ml
millimeter	mm
million gallons per day	mgd or MGD
million gallon	MG
minimum	min
national pipe threads	NPT
net positive suction head	NPSH
net positive suction head available	NPSHA
net positive suction head required	NPSHR
nitrogen oxide (total concentration of mono-nitrogen oxides such as nitric oxide (NO) and nitrogen dioxide (NO ₂))	NO _x
nominal pipe size	NPS
number	no.
operator interface terminal	OIT
ounce	oz
ounce-force	ozf
outside diameter	OD
parts per hundred	pph
parts per million	ppm
parts per billion	ppb
polyvinyl chloride	PVC
post meridian	p.m.
pound	lb
pounds per square inch	psi
pounds per square inch absolute	psia
pounds per square inch gauge	psig

pounds per square foot	psf
process control system	PCS
programmable logic controller	PLC
revolutions per minute	rpm
second	sec
specific gravity	sp gr, or SG
square	sq
square foot	sq ft, sf, or ft ²
square inch	sq in., or in ²
square yard	sq yd, or SY
standard	std
standard cubic feet per minute	scfm
total dynamic head	TDH
totally-enclosed fan-cooled	TEFC
volt	V
volts alternating current	vac
volts direct current	vdc
volatile organic compounds	VOC

1.5 REFERENCE STANDARDS

- A. Copies of Standards: Each entity engaged in the Work shall be familiar with reference standards applicable to its construction activity. Copies of applicable reference standards are not bound with the Contract Documents. Where reference standards are needed for a construction activity, obtain copies of standards from the publication source.
- B. Abbreviations and Names: Where reference standards, specifications, codes, manuals, Laws or Regulations, or other published data of international, national, regional or local organizations are referred to in the Contract Documents, the organization issuing the standard may be referred to by their acronym or abbreviation only. The following acronyms or abbreviations that may appear in the Contract Documents shall have the meanings indicated below. Listing is alphabetical by acronym.

Standard	Title
AA	Aluminum Association
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ACS	American Chemical Society
ADSC-IAFD	International Association of Foundation Drilling.

Standard	Title
AEIC	Association of Edison Illuminating Companies
AF&PA	American Forest and Paper Association
ABMA	American Bearing Manufacturers Association (formerly Anti-Friction Bearing Manufacturers Association (AFBMA))
AGMA	American Gear Manufacturers Association
AI	Asphalt Institute
AIA	American Institute of Architects
AIChE	American Institute of Chemical Engineers
AISC	American Institute of Steel Construction
ISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALSC	American Lumber Standards Committee
AMA	Acoustical Materials Association
AMCA	Air Movement and Control Association
AMP	National Association of Architectural Metal Manufacturers, Architectural Metal Products Division
ANSI	American National Standards Institute
APA	The Engineered Wood Association
APHA	American Public Health Association
API	American Petroleum Institute
AREA	American Railway Engineering Association
ARI	Air Conditioning and Refrigeration Institute
ASAE	American Society of Agricultural Engineers
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASNT	American Society for Non-Destructive Testing
ASQ	American Society for Quality
ASSE	American Society of Safety Engineers
ASTM	American Society for Testing and Materials
AWCI	Association of the Wall and Ceiling Industry
AWI	Architectural Woodwork Institute
AWPA	American Wood Protection Association
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BAAQMD	Bay Area Air Quality Management District
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association
CBMA	Certified Ballast Manufacturers Association

Standard	Title
CDA	Copper Development Association
CEMA	Conveyor Equipment Manufacturers Association
CGA	Compressed Gas Association
CISCA	Ceilings and Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CMAA	Crane Manufacturers Association of America
CRSI	Concrete Reinforcing Steel Institute
CSI	Construction Specifications Institute
DIN	Deutsches Institut für Normung eV (German Institute for Standardization)
DIPRA	Ductile Iron Pipe Research Association
EJCDC	Engineers Joint Contract Documents Committee
EJMA	Expansion Joint Manufacturers Association, Inc.
ETL	Intertek Testing Services, Inc. (formerly ETL Testing Laboratories, Inc.)
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FM	Factory Mutual (FM Global)
FRPI	Fiberglass Reinforced Plastics Institute
FS	Federal Specification
GA	Gypsum Association
GANA	Glass Association of North America
HEW	United States Department of Health, Education and Welfare
HI	Hydraulic Institute
HMI	Hoist Manufacturers Institute
HUD	United States Department of Housing and Urban Development
IBC	International Building Code
ICC	International Code Council
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronics Engineers
IESNA	Illuminating Engineering Society of North America
IFI	Industrial Fasteners Institute
IRI	Industrial Risk Insurers
ISA	Instrumentation, Systems, and Automation Society (formerly Instrument Society of America)
ISO	Insurance Services Office
ISO	International Organization for Standardization
LPI	Lightning Protection Institute

Standard	Title
MIA	Marble Institute of America
ML/SFA	Metal Lath/Steel Framing Association
MS	Military Specifications
MSS	Manufacturers' Standardization Society
MMA	Monorail Manufacturers Association
NAAMM	National Association of Architectural Metal Manufacturers
NACE	National Association of Corrosion Engineers
NAPF	National Association of Pipe Fabricators, Inc.
NARUC	National Association of Regulatory Utilities Commissioners
NBHA	National Builders Hardware Association
NBS	United States Department of Commerce, National Bureau of Standards
NCMA	National Concrete Masonry Association
NEC	National Electric Code
NELMA	Northeastern Lumber Manufacturers' Association
NEMA	National Electrical Manufacturers Association
NESC	National Electrical Safety Code
NETA	International Electrical Testing Association
NFPA	National Fire Protection Association
NFRC	National Fenestration Rating Council
NGA	National Glass Association
NHLA	National Hardwood Lumber Association
NHPMA	Northern Hardwood and Pine Manufacturers Association
NIST	United States Department of Commerce, National Institute of Standards and Technology
NLGA	National Lumber Grades Authority
NRCA	National Roofing Contractors Association
NRMCA	National Ready Mixed Concrete Association
NSF	National Sanitation Foundation
NSSGA	National Stone, Sand, and Gravel Association
NTMA	National Terrazzo and Mosaic Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Precast/Prestressed Concrete Institute
PEI	Porcelain Enamel Institute
PFI	Pipe Fabrication Institute
PPI	Plastics Pipe Institute
PGMC	Primary Glass Manufacturers Council
PS	Product Standards Section, United States Department of Commerce

Standard	Title
RCSC	Research Council on Structural Connections (part of AISC)
RMA	Rubber Manufacturers Association
SAE	Society of Automotive Engineers
SCAQMD	Southern California Air Quality Management District
SCPRF	Structural Clay Products Research Foundation
SCTE	Society of Cable Telecommunications Engineers
SDI	Steel Deck Institute
SDI	Steel Door Institute
SIGMA	Sealed Insulating Glass Manufacturing Association
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractor's National Association
SPI	Society of the Plastics Industry
SPIB	Southern Pine Inspection Bureau
SSPC	Society for Protective Coatings
SWI	Steel Window Institute
TCNA	Tile Council of North America
TEMA	Tubular Exchanger Manufacturers Association
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance
UL	Underwriters Laboratories, Inc.
USAB	United States Access Board
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency
USGBC	United States Green Building Council
USGS	United States Geological Survey
USPHS	United States Public Health Service
WCLIB	West Coast Lumber Inspection Bureau
WCMA	Window Covering Manufacturers Association
WCMA	Wood Component Manufacturers Association
WDMA	Window and Door Manufacturers Association
WEF	Water Environment Federation
WWEMA	Water and Wastewater Equipment Manufacturers Association
WWPA	Western Wood Products Association

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 43 00

QUALITY ASSURANCE

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section covers Quality Assurance and Quality Control requirements for this contract.
- B. The Contractor is responsible for controlling the quality of work, including work of its subcontractors, and suppliers and for assuring the quality specified in the Technical Specifications is achieved.
- C. Refer to the General Conditions Article 6 - Contractor's Responsibilities, paragraphs 6.01, 6.02, and 6.03.

1.2 SUMMARY:

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and control services required by, including but not limited to, Engineer, Owner, or authorities having jurisdiction, are not limited by provisions of this Section.
- C. Related Requirements:
 - 1. Divisions 01 through 46 Sections for specific test and inspection requirements.

1.3 REFERENCES:

- A. American Society for Testing and Materials (ASTM):

1. E329: Standard Specification for Agencies Engaged in Construction Inspection and/or Testing

1.4 DEFINITIONS:

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Engineer.
- C. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- D. Product Testing: Tests and inspections that are performed by a Nationally Recognized Testing Laboratory (NRTL), an (National Voluntary Laboratory Accreditation Program (NVLAP), or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- E. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- I. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five (5) previous projects similar in nature, size,

and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.5 CONFLICTING REQUIREMENTS:

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Engineer for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Engineer for a decision before proceeding.

1.6 SUBMITTALS:

- A. Shop Drawings: Provide plans, sections, dimensions, and elevations, indicating materials and size of proposed construction.
 - 1. Indicate manufacturer and model number of individual components.
 - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.
- B. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- C. Qualification Data: For Contractor's quality-control personnel.
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN:

- A. Quality Control Plan, General: Submit quality-control plan within thirty (30) days of Notice to Proceed. Submit in format acceptable to Engineer. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
 - 1. Project quality-control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
 - 1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor- elected tests and inspections.
 - 2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
 - 3. Owner-performed tests and inspections indicated in the Contract Documents.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and accepted mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of accepted and rejected results. Include work Engineer has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.8 REPORTS AND DOCUMENTS:

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.

3. Name, address, and telephone number of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector, as applicable.
 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of technical representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.

- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.9 QUALITY ASSURANCE:

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - d. When testing is complete, remove test specimens, assemblies; do not reuse products on Project.
 - 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Engineer with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 - K. Codes and Standards: Refer to General Conditions Article 3 - Contract Documents: Intent, Amending, Reuse, paragraph 3.02 of the General Conditions.
 - L. Copies of applicable referenced standards are not included in the Contract Documents. Where copies of standards are needed by the Contractor for superintendence and quality control of the work, the Contractor shall obtain a copy or copies directly from the publication source and maintain at the jobsite, available to the Contractor's personnel, subcontractors, and Engineer
 - M. Quality of Materials: Unless otherwise specified, all materials and equipment furnished for permanent installation in the Work shall conform to applicable standards and specifications and shall be new, unused, and free from defects and imperfections, when installed or otherwise incorporated in the Work. The Contractor shall not use material and equipment for any purpose other than that intended or specified unless the Engineer authorizes such use.
 - N. Where so specified, products or workmanship shall also conform to the additional performance requirements included within the Contract Documents to establish a higher or more stringent standard or quality than that required by the referenced standard.
- 1.10 OFFSITE INSPECTION:
- A. When the specifications require inspection of materials or equipment during the production, manufacturing, or fabricating process, or before shipment, such services shall be performed by the Owner's independent testing laboratory, or inspection organization acceptable to Engineer in conjunction with or by the Engineer.
 - A. The Contractor shall give appropriate written notice to the Engineer not less than thirty (30) days before offsite inspection services are required, and shall provide for the

producer, manufacturer, or fabricator to furnish safe access and proper facilities and to cooperate with inspecting personnel in the performance of their duties.

1.11 MATERIALS AND EQUIPMENT:

- A. The Contractor shall maintain control over procurement sources to ensure that materials and equipment conform to specified requirements in the Contract Documents.
- B. The Contractor shall comply with manufacturer's printed instructions regarding all facets of materials and/or equipment movement, storage, installation, testing, startup, and operation. Should circumstances occur where the contract documents are more stringent than the manufacturer's printed instructions, the Contractor shall comply with the specifications. In cases where the manufacturer's printed instructions are more stringent than the contract documents, the Contractor shall advise the Engineer of the disparity and conform to the manufacturer's printed instructions. In either case, the Contractor is to apply the more stringent specification or recommendation, unless accepted otherwise by the Engineer.

1.12 QUALITY CONTROL:

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - 2. The Contractor shall furnish a construction schedule and a minimum of 48 hour notice of readiness for testing and inspection of the work. The Engineer shall determine the exact time and location of field sampling and testing, and may require such additional sampling and testing to determine that materials and equipment conform with data previously furnished by Contractor and with the Contract Documents.
 - 3. The Contractor shall schedule the work to permit adequate time for testing and re- testing should test results not conform to the contract documents. Lack of testing or inspection which is attributable to insufficient notice by the Contractor or failure of the Contractor to cooperate, will be cause for rejection of the work.
 - 4. The Contractor shall deliver materials in sufficient quantities to the Owner's testing agency as may be required. Laboratory testing shall be performed within a reasonable time, consistent with the specified standards.
 - 5. The Contractor shall furnish material samples and cooperate in the field sampling and testing activities, interrupting the work when necessary. The Contractor shall furnish personnel, facilities and access to assist in the sampling and testing activities.

6. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 2. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
 3. Comply with manufacturers' instructions, including each step in sequence.
 4. When manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
 5. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
 6. Perform Work by persons qualified to produce required and specified quality.
 7. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.
 8. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.
 9. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner
 10. Notify testing agencies at least twenty-four (24) hours in advance of time when Work that requires testing or inspecting will be performed.
 11. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 12. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.

13. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Tolerances:
1. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
 2. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.
 3. Adjust products to appropriate dimensions; position before securing products in place.
- D. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections.
- E. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- F. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- G. Testing Agency Responsibilities: Cooperate with Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.
- H. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as

requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.
- I. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- J. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
 1. Distribution: Distribute schedule to Owner, Engineer, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.13 SPECIAL TESTS AND INSPECTIONS:

- A. Special Tests and Inspections: Owner will engage a qualified agency to conduct special tests and inspections required, as follows:
 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Engineer and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality- control service to Engineer with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.

6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Verify utility services are available, of correct characteristics, and in correct locations.

3.2 PREPARATION:

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

3.3 QUALITY CONTROL:

- A. Quality control is the responsibility of the Contractor, and the Contractor shall maintain control over construction and installation processes to assure compliance with specified requirements.
- B. Certifications for personnel, procedures, and equipment associated with special processes (e.g., welding, cable splicing, surveying) shall be maintained by the Contractor, available for inspection by the Engineer. Copies shall be made available to the Engineer upon request.
- C. Means and methods of construction and installation processes are the responsibility of the Contractor, and at no time is it the intent of the Engineer to supersede or void that responsibility.

3.4 TEST AND INSPECTION LOG:

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Engineer.
 - 4. Identification of testing agency or special inspector conducting test or inspection.

- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Engineer's reference during normal working hours.

3.5 REPAIR AND PROTECTION:

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 29 Cutting and Patching.
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

+ + END OF SECTION + +

SECTION 01 51 05

TEMPORARY UTILITIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all temporary utilities and temporary facilities required for the Project, including the following:
 - a. Electricity.
 - b. Lighting.
 - c. Heating, cooling, ventilating, and temporary enclosures.
 - d. Water.
 - e. Sanitary facilities.
 - f. First-aid facilities.
 - g. Fire protection.
2. Make all arrangements with utility owners for temporary utilities and with others as appropriate for temporary facilities. Obtain required permits and approvals for temporary utilities and temporary facilities.
3. Pay all service costs for utilities and facilities indicated in this Section as CONTRACTOR's responsibility, including cost of electricity, water, fuel, and other utility services and temporary facilities required for the Work.
4. Continuously maintain adequate temporary utilities and temporary facilities for all purposes for the Project, until removal of temporary utilities and temporary facilities. At minimum, provide and maintain temporary utilities and temporary facilities through Substantial Completion and removal of temporary field offices and sheds unless otherwise approved in writing by ENGINEER.
5. Should OWNER occupy part of the Work prior to Substantial Completion of the entire Work, cost of utilities consumed via temporary utilities serving the portion occupied by OWNER will be shared proportionately by OWNER and CONTRACTOR as mutually agreed to by the parties.
6. Maintain, including cleaning, temporary utilities and temporary facilities, and continuously provide consumables as required.
7. Temporary utilities and temporary facilities shall be adequate for personnel using the Site and the needs of the Project.

8. Provide temporary utilities and temporary facilities in compliance with Laws and Regulations and, when applicable, requirements of utility owners.

1.2 REQUIREMENTS FOR TEMPORARY UTILITIES AND TEMPORARY FACILITIES

A. Electrical:

1. Provide temporary electrical service required for the Work, including continuous power for temporary field offices and sheds. Provide temporary outlets with circuit breaker protection and ground fault protection.
2. Furnish, locate and install area distribution boxes such that the individual trades may use their own construction type extension cords to obtain adequate power, and artificial lighting where required by inspectors and for safety.
3. Provide all temporary electrical services, wire, generators, etc. required for performance of the Work inclusive of maintaining existing facilities in service during required primary electrical service shutdowns.
4. Pay all bills for temporary power required for the performance of the Work where required during shutdowns, bypass pumping etc.
5. Use of Owner's existing standby generator facilities will not be allowed.

B. Lighting.

1. Provide lighting at the Site of not less than five foot-candles for open areas and not less than ten foot-candles for stairs and shops. Provide not less than one, 300-watt lamp every 15 feet in indoor work areas. Provide night security lighting of not less than five foot-candles within 50 feet of all parts of the Site during hours of darkness, controlled by photocell.
2. Do not work in areas with insufficient lighting. Where lighting is insufficient for the work activities to be performed, provide additional temporary lighting.
3. Provide temporary lighting sufficient for observation of the Work by ENGINEER and inspection by CONTRACTOR and authorities having jurisdiction. Where required by ENGINEER, provide additional temporary lighting.

C. Heating, Ventilating, and Enclosures.

1. Provide sufficient temporary heating, cooling, ventilating, and enclosures to ensure safe working conditions and prevent damage to existing facilities and the Work.
2. Except where otherwise specified, temporary heating shall maintain temperature of the space served between 50 degrees F and maximum design temperature of building or facility and its contents.

3. Maintain temperature of areas occupied by OWNER's personnel or electronic equipment, including offices, lunch rooms, locker rooms, toilet rooms, and rooms containing computers, microprocessors, and control equipment, between 65 degrees F and 80 degrees F with relative humidity less than 75 percent.
4. Required temperature range for storage areas and certain elements of the Work, including preparation of materials and surfaces, installation or application, and curing as applicable, shall be in accordance with the Contract Documents for the associated Work and the Supplier's recommended temperature range for storage, application, or installation, as appropriate.
5. Provide temporary ventilation sufficient to prevent accumulation in construction areas and areas occupied by OWNER of hazardous and nuisance levels or concentrations of dust and particulates, mist, fumes or vapors, odors, and gases, associated with construction.
6. Provide temporary enclosures and partitions required to maintain required temperature and humidity.

D. Water:

1. General:

- a. OWNER will provide a place of temporary connection for construction water at site. Obtain and install a meter from the Owner and pay for water used at Owner's current rate.
- b. Provide temporary water facilities approved by OWNER including piping, valves, , backflow preventers, pressure regulators, and other appurtenances. Provide freeze-protection as required.
- c. Continuously maintain adequate water flow and pressure for all purposes during the Project, until removal of temporary water systems.

2. Water for Construction Purposes:

- a. Provide water for Site maintenance and cleaning and, water necessary for construction activities, and water for disinfecting and testing of systems.
- b. Contractor may use existing hose bibbs for short-term wash-downs and intermittent use of water for work areas in the existing building. Obtain consent of ENGINEER and OWNER if connections to existing hose bibbs and similar existing connections will be used for more than one day at a time.

3. Water for Human Consumption and Sanitation:

- a. Provide potable water in accordance with Laws and Regulations for consumption by personnel at the Site, for field offices, and for sanitary facilities.

- b. When necessary, provide bottled, potable water for use and consumption by personnel at the Site, including CONTRACTOR, ENGINEER, and visitors to the Site.
- E. Sanitary Facilities.
 - 1. Prior to starting the Work, provide suitably-enclosed chemical or self-contained toilets for CONTRACTOR's employees, Subcontractors, Suppliers, ENGINEER, and visitors to the Site. Location of temporary toilets shall be acceptable to OWNER and ENGINEER.
 - 2. Refer to Paragraph 0.D. of this Section for requirements for water intended for human consumption during construction.
 - 3. Provide suitable temporary washing facilities for employees and visitors.
 - 4. Keep all facilities, regardless of type, in a clean and sanitary condition and comply with the requirements and regulations of the area in which the Work is performed.
- F. First-aid Facilities.
 - 1. Provide temporary first-aid stations at or immediately adjacent to the Site's work areas, and inside CONTRACTOR's temporary field office. Locations of first-aid stations shall be determined by CONTRACTOR's safety representative. Replenish supplies in first-aid stations as items are used, prior to expiration of items, and as necessary. Monitor and log inventory of supplies in first-aid stations in accordance with requirements for monitoring and logging safety equipment as indicated in Section 01 35 23, Safety Requirements.
 - 2. Provide list of emergency telephone numbers at each hardwired telephone at the Site. List shall be in accordance with the list of emergency contact information required in Section 01 35 23, Safety Requirements.
- G. Fire Protection.
 - 1. Provide temporary fire protection, including portable fire extinguishers rated not less than 2A or 5B in accordance with NFPA 10, Portable Fire Extinguishers, for each temporary building and for every 3,000 square feet of floor area under construction.
 - 2. Provide Class A (ordinary combustibles), Class B (combustible liquids and gases), and Class C (electrical equipment) fire extinguishers as necessary.
 - 3. Comply with NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations, and requirements of fire marshals and authorities having jurisdiction at the Site.

1.3 USE OF OWNER'S SYSTEM

- A. Existing Utility Systems: 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.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment for temporary utilities and temporary facilities may be new or used, but shall be adequate for purposes intended and shall not create unsafe conditions, and shall comply with Laws and Regulations.
- B. Provide required materials, equipment, and facilities, including piping, cabling, controls, and appurtenances.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install temporary utilities and temporary facilities in neat, orderly, manner, and make structurally, mechanically, and electrically sound throughout.
- B. Location of Temporary Utilities and Temporary Facilities:
 - 1. Locate temporary systems for proper function and service.
 - 2. Temporary systems shall not interfere with or provide hazards or nuisances to: the Work under this and other contracts, movement of personnel, traffic areas, materials handling, hoisting systems, storage areas, finishes, and work of utility owners and others.
 - 3. Do not install temporary utilities on the ground, with the exception of temporary extension cords, hoses, and similar systems in place for short durations.
- C. Modify and extend temporary systems as required by progress of the Work.

3.2 USE

- A. Maintain temporary systems to provide safe, continuous service as required.
- B. Properly supervise operation of temporary systems:
 - 1. Enforce compliance with Laws and Regulations.
 - 2. Enforce safe practices.
 - 3. Prevent abuse of services.
 - 4. Prevent nuisances and hazards caused by temporary systems and their use.
 - 5. Prevent damage to finishes.
 - 6. Ensure that temporary systems and equipment do not interrupt continuous progress of construction.

- C. At end of each work day, check temporary systems and verify that sufficient consumables are available to maintain operation until work is resumed at the Site. Provide additional consumables if the supply on hand is insufficient.

3.3 REMOVAL

- A. Completely remove temporary utilities, temporary facilities, equipment, and materials when no longer required. Repair damage caused by temporary systems and their removal and restore the Site to condition required by the Contract Documents; if restoration of damaged areas is not specified, restore to preconstruction condition.
- B. Where temporary utilities are disconnected from existing utility, provide suitable, watertight or gastight (as applicable) cap or blind flange, as applicable, on service line, in accordance with requirements of utility owner.
- C. Where permanent utilities and systems were used for temporary utilities, upon Substantial Completion replace all consumables such as filters and light bulbs and parts used during the Work.

+ + END OF SECTION + +

SECTION 01 57 33

SECURITY

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes general requirements for security at the Site, including accessing the Site, securing the Work, temporary fencing, and other requirements.
2. CONTRACTOR shall safely guard all the Work, the Project, materials, equipment, and property from loss, theft, damage, and vandalism until Substantial Completion, unless otherwise agreed upon by the parties.
3. CONTRACTOR's duty includes safely guarding OWNER's property in vicinity of the Work and Project, and other private property in the vicinity of the Project from injury and loss in connection with performance of the Project.
4. Employ watchmen as required to provide required security and prevent unauthorized entry.
5. Costs for security required under this Section shall be paid by CONTRACTOR.
6. Make no claim against OWNER for damage resulting from trespass.
7. Remedy damage to property of OWNER and others arising from failure to furnish adequate security.
8. Provide temporary fencing if required in accordance with the Contract Documents.
9. CONTRACTOR's security measures shall be at least equal to those usually provided by OWNER or facility manager to protect existing facilities during normal operation.

1.2 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Temporary Fencing: Submit site plan drawings showing proposed locations and extent of temporary site security fencing and each breach therein.
2. Product Data:
 - a. Temporary Fencing: Manufacturer's literature, specifications, and installation instructions for temporary site security fencing proposed.

B. Informational Submittals: Submit the following:

1. Employee Information: Submit to OWNER the following: do not submit to ENGINEER:

- a. Format of employee background data.
- b. Background data for employees to whom identification badges will be furnished.
- c. Updated listing of personnel to whom identification badges have been issued. Submit updated listing within 24 hours of a change in the list or change in an employee's Site access status.

1.3 CONTRACTOR'S SITE ACCESS AND SECURITY PROCEDURES

- A. Comply with Section 01 55 13, Access Roads and Parking Areas.
- B. Comply with OWNER's security procedures and access restrictions at the Site throughout the Project. Comply with the following:
 - 1. Personnel Identification and Background Checks:
 - a. All CONTRACTOR personnel, including Subcontractors, Suppliers, and others associated with the Project shall wear, in a visible location, at all times at the Site a durable, waterproof badge with wearer's photograph, name, signature, and as applicable employee number; CONTRACTOR's name; employer (if other than CONTRACTOR), and Project name.
 - b. Prior to issuing badge, submit to OWNER copy of background data sheet for each person to whom badge may be issued for OWNER acceptance; do not issue badge without OWNER acceptance of background data for that person.
 - c. Submit for OWNER's acceptance the proposed format of employee background data sheet.
 - 2. General Provisions Regarding Personnel Identification:
 - a. Prerequisites to Issuance of Personnel Identification Badges:
 - 1) Do not issue personnel identification badge until the person receiving the badge is documented by CONTRACTOR as:
 - a) Being eligible to perform work in the jurisdiction where the Project is located.
 - b) Has received all required safety instructions, training, and equipment.
 - c) Is known to CONTRACTOR as being qualified to perform the Work to which the person will be assigned.
 - b. Listing of Personnel to Whom Badges are Issued:
 - 1) Maintain and continuously update a listing or log of all personnel to whom personnel identification badges have been issued.
 - 2) Listing or log shall indicate each person's full name, home address, personal telephone number, employer name, and employer address and telephone number.
 - 3) Submit copy of listing or to OWNER in accordance with Article 1.2 of this Section.
 - 3. Vehicle Identification:
 - a. While on-Site, all CONTRACTOR vehicles, including employee vehicles, shall display vehicle identification tag.

- b. Vehicle tag shall include the following information: Site name, CONTRACTOR name, contract designation, vehicle license plate number and state of registration, name and employer of vehicle owner, and vehicle owner contact telephone number.
- 4. Parking:
 - a. Do not park outside of designated CONTRACTOR parking area to be determined by the OWNER. Prepare and maintain parking area as required.
 - b. Personal vehicles are not allowed outside the contractor parking area.

PART 2 – PRODUCTS

2.1 TEMPORARY FENCING

- A. When security fencing or barriers are breached or temporarily removed for the Project, provide and maintain temporary security fencing equal to existing, unless otherwise specified, in manner satisfactory to ENGINEER and OWNER.

PART 3 – EXECUTION

3.1 TEMPORARY FENCING

- A. Installation:
 - 1. Provide temporary fencing for site security so that integrity of site security is maintained throughout the Project.
 - 2. Install temporary fencing used for site security in accordance with the Contract Documents and fence manufacturer's instructions.
- B. Maintenance:
 - 1. Maintain temporary fencing throughout the Project.
 - 2. Repair damage to temporary fencing and replace fencing when required to preserve Site security.
- C. Removal:
 - 1. Remove temporary fencing when permanent site security fencing is in place and fully functional, or when otherwise directed or ENGINEER.

+ + END OF SECTION + +

SECTION 01 61 00

COMMON PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes:
 - a. Common requirements for materials and equipment.
 - b. Compatibility of materials and equipment.

1.2 REQUIREMENTS FOR MATERIALS AND EQUIPMENT

A. Unless otherwise indicated in the Contract Documents, furnish materials and equipment that:

1. Have not previously been incorporated into another project or facility; and
2. Have not changed ownership after initial shipment from the manufacturer's factory or facility; and
3. If stored since their manufacture or fabrication, have, while in storage, been properly maintained and serviced in accordance with the manufacturer's recommendations for long-term storage; submit documentation as required by ENGINEER that such maintenance and service has been performed; and
4. That the item(s) have not been subject to degradation or deterioration since manufacture; and
5. Are the current model(s) or type(s) furnished by the Supplier including hardware, firmware, and software.

B. To the extent possible, furnish from a single source those materials and equipment that are of the same generic kind.

C. Furnish materials and equipment complete with accessories, trim, finish, fasteners, and other items shown, indicated, or required for a complete installation for the indicated use and performance.

D. Standard Items: When available, and unless custom or nonstandard options are specified or indicated, furnish standard materials and equipment of types that have been produced and used successfully in similar situations on other projects.

E. Visual Matching: Where required in the Contract Documents, furnish materials and equipment that match (as determined by ENGINEER) referenced existing construction, and mock-ups and Sample(s) approved by ENGINEER.

- F. Where the Contract Documents include the phrase “as selected” for color of materials or equipment, finish pattern, option, or similar phrase, provide materials and equipment selected by ENGINEER as follows:
1. Standard Range: Where the Contract Documents include the phrase “standard range of colors, patterns, textures” or similar wording, provide color, pattern, density, or texture selected by ENGINEER from manufacturer’s product line that does not include premium items.
 2. Full Range: Where the Contract Documents include the phrase “full range of colors, patterns, textures” or similar wording, ENGINEER will select color, pattern, density, or texture from manufacturer’s entire product line, including standard and premium items.

1.3 COMPATIBILITY

- A. Similar materials and equipment by the same Supplier shall be compatible with each other, unless otherwise indicated in the Contract Documents or approved by ENGINEER.
- B. Provide materials and equipment compatible with items previously selected or installed on the Project.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 65 00

PRODUCT DELIVERY REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes the general requirements for preparing for shipping, delivering, and handling materials and equipment.
2. CONTRACTOR shall make all arrangements for transporting, delivering, and handling of materials and equipment required for prosecution and completion of the Work.
3. When required, move stored materials and equipment without additional compensation and without changes to the Contract Times.

1.2 SUBMITTALS

- A. Refer to individual Specification Sections for submittal requirements relative to delivering and handling materials and equipment.

1.3 PREPARING FOR SHIPMENT

- A. When practical, factory-assemble materials and equipment. Match mark or tag separate parts and assemblies to facilitate field assembly. Cover machined and unpainted parts that may be damaged by the elements with strippable, protective coating.
- B. Package materials and equipment to facilitate handling, and protect materials and equipment from damage during shipping, handling, and storage. Mark or tag outside of each package or crate to indicate the associated purchase order number, bill of lading number, contents by name, OWNER's contract name and number, CONTRACTOR name, equipment number, and approximate weight. Include complete packing lists and bills of materials with each shipment.
- C. Protect materials and equipment from exposure to the elements and keep thoroughly dry and dust-free at all times. Protect painted surfaces against impact, abrasion, discoloration, and other damage. Lubricate bearings and other items requiring lubrication in accordance with manufacturer's instructions.
- D. Advance Notice of Shipments:
1. Keep ENGINEER informed of delivery of all materials and equipment to be incorporated in the Work.

2. Upon receipt of Supplier's advance notice of shipment, at least seven days prior to delivery of materials and equipment, provide ENGINEER written notification of anticipated date and place of arrival of the following:
 - a. All construction materials including control equipment, instrumentation, and other supplies.
- E. Do not ship materials and equipment until:
 1. Related Shop Drawings, Samples, and other submittals have been approved or accepted (as applicable) by ENGINEER, including, but not necessarily limited to, all Action Submittals associated with the materials and equipment being delivered.
 2. Manufacturer's instructions for handling, storing, and installing the associated materials and equipment have been submitted to and accepted by ENGINEER in accordance with the Specifications.
 3. Results of source quality control testing (factory testing), when required by the Contract Documents for the associated materials or equipment, have been reviewed and accepted by ENGINEER.
 4. Facilities required for handling materials and equipment in accordance with manufacturer's instructions are in place and available.
 5. Required storage facilities have been provided.

1.4 DELIVERY

- A. Scheduling and Timing of Deliveries:
 1. Arrange deliveries of materials and equipment in accordance with the accepted Progress Schedule and in ample time to facilitate inspection prior to installation.
 2. Schedule deliveries to minimize space required for and duration of storage of materials and equipment at the Site or delivery location, as applicable.
 3. Coordinate deliveries to avoid conflicting with the Work and conditions at Site, and to accommodate the following:
 - a. Work of subcontractors and OWNER.
 - b. Storage space limitations.
 - c. Availability of equipment and personnel for handling materials and equipment.
 - d. OWNER's use of premises.
 4. Deliver materials and equipment to the Site during regular working hours.
 5. Deliver materials and equipment to avoid delaying the Work and the Project, including work of other contractors, as

applicable. Deliver anchor system materials, including anchor bolts to be embedded in concrete or masonry, in ample time to avoid delaying the Work.

B. Deliveries:

1. Shipments shall be delivered with CONTRACTOR's name, Subcontractor's name (if applicable), Site name, Project name, and contract designation (example: "ABC Construction Co., City of Somewhere, Idaho, Wastewater Treatment Plant Primary Clarifier Improvements, Contract 25, General Construction") clearly marked.
2. Site may be listed as the "ship to" or "delivery" address; but OWNER shall not be listed as recipient of shipment unless otherwise directed in writing by ENGINEER.
3. Provide CONTRACTOR's telephone number to shipper; do not provide OWNER's telephone number.
4. Arrange for deliveries while CONTRACTOR's personnel are at the Site. CONTRACTOR shall receive and coordinate shipments upon delivery. Shipments delivered to the Site when CONTRACTOR is not present will be refused by OWNER and/or ENGINEER, and CONTRACTOR shall be responsible for the associated delays and additional costs, if incurred.

C. Containers and Marking:

1. Have materials and equipment delivered in manufacturer's original, unopened, labeled containers.
2. Clearly mark partial deliveries of component parts of materials and equipment to identify materials and equipment, to allow easy accumulation of parts, and to facilitate assembly.

D. Inspection of Deliveries:

1. Immediately upon delivery, inspect shipment to verify that:
 - a. Materials and equipment comply with the Contract Documents and approved or accepted (as applicable) submittals.
 - b. Quantities are correct.
 - c. Materials and equipment are undamaged.
 - d. Containers and packages are intact and labels are legible.
 - e. Materials and equipment are properly protected.
2. Promptly remove damaged materials and equipment from the Site and expedite delivery of new, undamaged materials and equipment, and remedy incomplete or lost materials and equipment to furnish

materials and equipment in accordance with the Contract Documents, to avoid delaying progress of the Work.

3. Advise ENGINEER in writing when damaged, incomplete, or defective materials and equipment are delivered, and advise ENGINEER of the associated impact on the Progress Schedule.

1.5 HANDLING OF MATERIALS AND EQUIPMENT

- A. Provide equipment and personnel necessary to handle materials and equipment, including those furnished by OWNER, by methods that prevent soiling or damaging materials and equipment and packaging.
- B. Provide additional protection during handling as necessary to prevent scraping, marring, and otherwise damaging materials and equipment and surrounding surfaces.
- C. Handle materials and equipment by methods that prevent bending and overstressing.
- D. Lift heavy components only at designated lifting points.
- E. Handle materials and equipment in safe manner and as recommended by the manufacturer to prevent damage. Do not drop, roll, or skid materials and equipment off delivery vehicles or at other times during handling. Hand-carry or use suitable handling equipment.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 66 00

PRODUCT STORAGE AND HANDLING REQUIREMENTS

PART 1 – GENERAL

1.1 DESCRIPTION

- A. This Section includes general requirements for storing and protecting materials and equipment.

1.2 STORAGE

- A. Store and protect materials and equipment in accordance with manufacturer's recommendations and the Contract Documents.
- B. CONTRACTOR shall make all arrangements and provisions necessary for, and pay all costs for, storing materials and equipment. Excavated materials, construction equipment, and materials and equipment to be incorporated into the Work shall be placed to avoid injuring the Work and existing facilities and property, and so that free access is maintained at all times to all parts of the Work and to public utility installations in vicinity of the Work. Store materials and equipment neatly and compactly in locations that cause minimum inconvenience to OWNER, other contractors, public travel, and owners, tenants, and occupants of adjoining property. Arrange storage in manner to allow easy access for inspection.
- C. Areas available at the Site for storing materials and equipment are shown or indicated in the Contract Documents, or as approved by ENGINEER.
- D. Store materials and equipment to become OWNER's property to facilitate their inspection and ensure preservation of quality and fitness of the Work, including proper protection against damage by freezing, moisture, and high temperatures with ambient temperatures as high as 100 degrees F. Store in indoor, climate-controlled storage areas all materials and equipment subject to damage by moisture, humidity, heat, cold, and other elements, unless otherwise acceptable to OWNER. When placing orders to Suppliers for equipment and controls containing computer chips, electronics, and solid-state devices, CONTRACTOR shall obtain, coordinate, and comply with specific temperature and humidity limitations on materials and equipment, because temperature inside cabinets and components stored in warm temperatures can approach 200 degrees F.
- E. CONTRACTOR shall be fully responsible for loss or damage (including theft) to stored materials and equipment.
- F. Do not open manufacturer's containers until time of installation, unless recommended by the manufacturer or otherwise specified in the Contract Documents.

- G Do not store materials or equipment in structures being constructed unless approved by ENGINEER in writing.
- H Do not use lawns or other private property for storage without written permission of the owner or other person in possession or control of such premises.

1.3 PROTECTION

- A. Equipment to be incorporated into the Work shall be boxed, crated, or otherwise completely enclosed and protected during shipping, handling, and storage, in accordance with Section 01 65 00, Product Delivery Requirements.
- B. Store all materials and equipment off the ground (or floor) on raised supports such as skids or pallets.
- C. Protect painted surfaces against impact, abrasion, discoloration, and other damage. Painted equipment surfaces that are damaged or marred shall be repainted in their entirety in accordance with equipment manufacturer and paint manufacturer requirements, to the satisfaction of ENGINEER.
- D. Protect electrical equipment, controls, and instrumentation against moisture, water damage, heat, cold, and dust. Space heaters provided in equipment shall be connected and operating at all times until equipment is placed in operation and permanently connected.

1.4 UNCOVERED STORAGE

- A. The following types of materials may be stored outdoors without cover on supports so there is no contact with the ground:
 - 1. No materials shall be uncovered.

1.5 COVERED STORAGE

- A. The following materials and equipment may be stored outdoors on supports and completely covered with covering impervious to water:
 - 1. Grout and mortar materials.
 - 2. Masonry units.
 - 3. Soil materials and granular materials such as aggregate.
 - 4. PVC and CPVC pipe.
- B. Tie down covers with rope, and slope covering to prevent accumulation of water.
- C. Store loose granular materials, with covering impervious to water, in well-drained area or on solid surfaces to prevent mixing with foreign matter.

1.6 FULLY PROTECTED STORAGE

- A. Unless otherwise approved by ENGINEER and OWNER, store all material and equipment not named in Articles 1.4 and 1.5 of this Section on supports in buildings or trailers that have concrete or wooden flooring, roof, and fully closed walls on all sides. Covering with visquine plastic sheeting or similar material in space without floor, roof, and walls is not acceptable. Comply with the following:
 - 1. Provide heated storage for materials and equipment that could be damaged by low temperatures or freezing.
 - 2. Provide air-conditioned storage for materials and equipment that could be damaged by high temperatures.
 - 3. Protect mechanical and electrical equipment from being contaminated by dust, dirt, and moisture.
 - 4. Maintain humidity at levels recommended by manufacturers for electrical and electronic equipment.

1.7 MAINTENANCE OF STORAGE

- A. On scheduled basis, periodically inspect stored materials and equipment to ensure that:
 - 1. Condition and status of storage facilities is adequate to provide required storage conditions.
 - 2. Required environmental conditions are maintained on continuing basis.
 - 3. Materials and equipment exposed to elements are not adversely affected.
- B. Mechanical and electrical equipment requiring long-term storage shall have complete manufacturer's instructions for servicing each item, with notice of enclosed instructions shown on exterior of container or package.
 - 1. Comply with manufacturer's instructions on scheduled basis.
 - 2. Space heaters that are part of electrical equipment shall be connected and operated continuously until equipment is placed in service and permanently connected.

1.8 MICROPROCESSORS, PANELS, AND INSTRUMENTATION STORAGE

- A. Store panels, microprocessor-based equipment, electronics, and other devices subject to damage or decreased useful life because of temperatures below 40 degrees F or above 100 degrees F, relative humidity above 90 percent, or exposure to rain or exposure to blowing dust in climate-controlled storage space.
- B. Requirements:
 - 1. Storage shall be fully protected and climate controlled storage as specified in Article 1.6 of this section.

2. OWNER and ENGINEER have the right to inspect materials and equipment during normal working hours.
 3. Placed inside each panel or device a desiccant, volatile corrosion inhibitor blocks (VCI), moisture indicator, and maximum-minimum indicating thermometer.
 4. Check panels and equipment at least once per month. Replace desiccant, VCI, and moisture indicator as often as required, or every six months, whichever occurs first.
 5. Certified record of daily maximum and minimum temperature and humidity in storage facility shall be available for inspection by OWNER and ENGINEER. Certified record of monthly inspection, noting maximum and minimum temperature for month, condition of desiccant, VCI, and moisture indicator, shall be available for inspection by OWNER and ENGINEER.
- C. Costs for storing climate-sensitive materials and equipment shall be paid by CONTRACTOR. Replace panels and devices damaged during storage, or for which storage temperatures or humidity range has been exceeded, at no additional cost to OWNER. Delays resulting from such replacement are causes within CONTRACTOR's control.
- D. Do not ship panels and equipment to the Site until conditions at the Site are suitable for installation, including slabs and floors, walls, roofs, and environmental controls. Failure to have the Site ready for installation shall not relieve CONTRACTOR from complying with the Contract Documents.

1.9 RECORDS

- A. Keep up-to-date account of materials and equipment in storage to facilitate preparation of Applications for Payment, if the Contract Documents provide for payment for materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 71 33

PROTECTION OF THE WORK AND PROPERTY

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes general requirements for safety and protection that augment the requirements of the General Conditions, as may be modified by the Supplementary Conditions. This Section also includes requirements for barricades and warning signals, and protection of trees and plants, existing structures, floors, roofs, installed items, and landscaping.
2. CONTRACTOR shall be responsible for taking all precautions, providing all programs, and taking all actions necessary to protect personnel health and safety, and to protect the Work and all public and private property and facilities from damage, as specified in the General Conditions, Supplementary Conditions, and the Specifications.
3. To prevent damage, injury, or loss, CONTRACTOR's actions shall include the following:
 - a. Provide measures for safety of personnel at the Site, including workers engaged in the Work, delivery personnel, testing and inspection personnel, personnel of authorities having jurisdiction, other visitors to the Site, the public, OWNER's personnel, facility manager's personnel (if different from OWNER), ENGINEER, and Resident Project Representative (if any).
 - b. Storing apparatus, materials, supplies, and equipment in an orderly, safe manner that does not unduly interfere with progress of the Work or work of other contractors, utility owners, and owners of transportation rights-of-way.
 - c. Providing suitable storage facilities for materials and equipment subject to damage or degradation by exposure to climate, temperature, theft, breakage, or other cause.
 - d. Placing upon the Work or any part thereof only loads consistent with the safety and integrity of that portion of the Work and existing construction.

- e. Frequently removing and disposing of refuse, rubbish, scrap materials, and debris caused by CONTRACTOR's operations so that, at all times, the Site is safe, orderly, and workmanlike in appearance.
 - f. Providing temporary barricades, fencing, and guard rails around the following: openings, scaffolding, temporary stairs and ramps, around excavations, for elevated walkways, and other areas that may present a fall-hazard or hazard to vehicles.
- 4. Do not, except after written consent from proper parties, enter or occupy privately-owned property or premises with personnel, tools, materials or equipment, except on lands and easements provided by OWNER.
 - 5. CONTRACTOR has full responsibility for preserving public and private property and facilities on and adjacent to the Site. Direct or indirect damage done by, or on account of, any act, omission, neglect, or misconduct by CONTRACTOR in executing the Work, shall be remedied by CONTRACTOR, at his expense, to condition equal to that existing before damage was done.
 - 6. Owner May Remedy:
 - a. Should CONTRACTOR fail to protect and safeguard property and the Work after requests from ENGINEER or OWNER, OWNER may implement measures to protect property and the Work.
 - b. Cost of such OWNER-implemented measures shall be paid by CONTRACTOR. OWNER may deduct from payments due CONTRACTOR such amounts as set-offs in accordance with the Contract Documents.
 - c. Such right, however, shall not result in any obligation by OWNER or ENGINEER to continuously monitor or have responsibility for protection of property and the Work, which responsibility is exclusively CONTRACTOR's.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 BARRICADES AND WARNING SIGNALS

A. Barricades and Warning Signals – General:

- 1. Where the Work is performed on or adjacent to roadway, access road or driveway, right-of-way, or public place:

- a. Provide temporary barricades, fences, lights, warning signs, danger signals, watchmen, and take other precautionary measures for protecting persons, property, and the Work.
 - b. Use appropriately colored and reflective barricades, or paint barricades accordingly, to be visible at night.
 - c. From sunset to sunrise, provide and maintain not less than one temporary light at each barricade.
 - d. Erect sufficient barricades to keep vehicles from being driven on or into Work under construction.
 - e. Furnish watchmen in sufficient numbers to protect the Work.
2. Provide temporary barricades to protect personnel and property for Work not in or adjacent to transportation routes and vehicular travel areas, including indoor work, in accordance with Laws and Regulations.
 3. CONTRACTOR's responsibility for maintaining temporary barricades, signs, lights, and for providing watchmen shall continue until the Work is substantially complete in accordance with the Contract Documents, unless other provision for security and protection is agreed to by the parties. After Substantial Completion, protect Work and property during periods when final Work or corrective Work is underway.

B. Temporary Fencing:

3.2 TREE AND PLANT PROTECTION

A. Tree and Plant Protection – General:

1. Protect existing trees, shrubs, and plants on or adjacent to the Site, shown or designated to remain in place, against unnecessary cutting, breaking, damage, or skinning of trunk, branches, bark, and roots.
2. Do not store materials or equipment or park construction equipment and vehicles within foliage drip lines.
3. In areas subject to traffic, provide temporary fencing or temporary barricades to protect trees and plants.
4. Open fires are not allowed onsite.
5. Within the limits of the Work, water trees and plants that are to remain to maintain their health during construction operations.
6. Cover exposed roots with burlap, and keep such burlap continuously wet. Cover exposed roots with earth as soon as possible. Protect root systems from mechanical damage and damage by erosion, flooding, runoff, and noxious materials in solution.

7. If branches or trunks are damaged, prune branches immediately and protect cut or damaged areas with emulsified asphalt compounded specifically for horticultural use, in manner acceptable to ENGINEER.
8. When directed by ENGINEER, remove and dispose of at location away from the Site damaged trees and plants that die or suffer permanent injury, and replace each damaged tree or plant with specimen of equal or better species and quality.

3.3 PROTECTION OF EXISTING STRUCTURES

A. Underground Facilities:

1. Underground Facilities known to OWNER and ENGINEER, except water, gas, sewer, electric, and communications services to individual buildings and properties, are shown. Information shown for Underground Facilities is the best available to OWNER and ENGINEER but, in accordance with the General Conditions, as may be modified by the Supplementary Conditions, is not guaranteed to be correct or complete.
2. CONTRACTOR shall explore ahead of trenching and excavating Work and shall sufficiently uncover Underground Facilities that will or may interfere with the Work to determine their location, to prevent damage to Underground Facilities, and to prevent service interruption to structures and properties served by Underground Facilities. If CONTRACTOR damages an Underground Facility, CONTRACTOR shall restore it to its pre-construction condition, in accordance with requirements of the owner of the damaged facility and the Contract Documents.
3. Necessary changes in the location of the Work may be directed by ENGINEER to avoid Underground Facilities not shown or indicated on the Contract Documents.
4. If permanent relocation of an existing Underground Facilities is required and is not otherwise shown or indicated in the Contract Documents, CONTRACTOR may be directed in writing to perform the required work. When such relocation Work results in a change in the Contract Price, Contract Times, the associated Contract modification procedures and payment for such Work shall be in accordance with the Contract Documents.

B. Surface Structures:

1. Surface structures are existing buildings, structures, and other facilities at or above ground surface, including their foundations and any extension below ground surface. Surface structures include, but are not limited to, buildings, tanks, walls, bridges, roads, dams, channels, open drainage routes, exposed piping and utilities, poles, exposed wires, posts, signs, markers, curbs, walks, fencing, and other facilities visible at or above ground surface.
2. Existing surface facilities, including but not limited to guard rails, posts, guard cables, signs, poles, markers, curbs, and fencing, that are temporarily removed to facilitate the Work shall be replaced and restored to their pre-construction condition at CONTRACTOR's expense.

C. Protection of Underground Facilities and Surface Structures:

1. CONTRACTOR shall sustain in their places and protect from direct or indirect injury all Underground Facilities and surface structures located within or adjacent to the limits of the Work. Such sustaining and supporting shall be done carefully and as required by the party owning or controlling such structure or facility.
2. Before proceeding with the Work of sustaining and supporting such structure or facility, CONTRACTOR shall satisfy ENGINEER that methods and procedures to be used have been approved by party owning same.
3. CONTRACTOR shall bear all risks attending the presence or proximity of all Underground Facilities and surface structures within or adjacent to limits of the Work, in accordance with the Contract Documents.
4. CONTRACTOR shall be responsible for damage and expense for direct or indirect injury, caused by CONTRACTOR's activities, to structures and facilities. CONTRACTOR shall promptly repair damage caused by CONTRACTOR's activities, to the satisfaction of owner of damaged structure or facility.
5. Protection of Underground Facilities Under Roads and Parking Areas: Provide temporary, heavy-duty steel roadway plates to protect existing manholes, handholes, valve boxes, vaults, and other Underground Facilities near to or visible at the ground surface.

3.4 PROTECTION OF FLOORS AND ROOFS

A. Protection of Floors and Roofs – General:

1. Use proper protective covering when moving equipment, handling materials or other loads, when painting, handling mortar or grout, and when cleaning walls, ceilings, or structure contents.

2. Use metal pans to collect oil and cuttings from piping, conduits, and rod threading machines, and under metal cutting machines.
3. Do not load concrete floors less than 28 days old without written permission of ENGINEER. Do not load floors, roofs, or slabs in excess of design loading.
4. Do not load roofs without written permission of ENGINEER.
5. Restrict access to roofs, and keep CONTRACTOR personnel off existing roofs, except as required for the Work.
6. If access to roofs is required, roofing, parapets, openings, and all other construction on or adjacent to roof shall be protected with suitable plywood or other acceptable means.

3.5 PROTECTION OF INSTALLED MATERIALS, EQUIPMENT, AND LANDSCAPING

- A. Protect installed Work to prevent damage from subsequent operations. Remove protective items when no longer needed, prior to Substantial Completion of the Work.
- B. Control traffic to prevent damage to equipment, materials, and surfaces.
- C. Coverings:
 1. Provide temporary coverings to protect materials and equipment from damage.
 2. Cover projections, wall corners and jambs, sills, and soffits of openings, in areas used for traffic and for passage of materials and equipment in subsequent work.

+ + END OF SECTION + +

SECTION 01 73 19

INSTALLATION

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section describes general requirements for installing materials and equipment. Additional installation requirements are included in the various Specifications Sections in Divisions 02 through 49 and elsewhere in the Contract Documents.
2. CONTRACTOR shall provide all labor, materials, equipment, services, tools, and incidentals required to install materials and equipment.

1.2 QUALITY ASSURANCE

A. General:

1. Provide appropriate quality assurance for installing materials and equipment, and provide quality control over Suppliers, materials and equipment, services, Site conditions, and workmanship, to provide Work of the required quality.

B. Qualifications:

1. Installer:
 - a. Installers shall be experienced in the types of Work required, including, but not limited to, the requirements of Section 01 42 00, References, and the Division 02 through 49 Specifications where the particular element of the Work is specified.

C. Regulatory Requirements: Comply with the following:

1. 29 CFR 1910, OSHA.

PART 2 – PRODUCTS

2.1 EQUIPMENT DRIVE GUARDS

A. Equipment Drive Guards – General:

1. Unless otherwise shown or indicated, provide all-metal guards complying with 29 CFR 1910, Subpart O, with equipment driven by open shafts, belts, chains, pulleys, sheaves, or gears. Guards shall enclose drive and driven mechanism.
2. If material of guards are not otherwise specified, guards shall be galvanized sheet steel, galvanized woven wire, or expanded metal set in a frame of galvanized steel members, as appropriate.

3. Secure guards in position by steel braces or straps, securely fastened to frame of equipment, floor, or wall as required.
4. Fastenings shall allow removal of guards for servicing equipment.

2.2 MISCELLANEOUS MATERIALS

- A. Shims shall be Type 304L stainless steel, clean and free of slag.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. General:
 1. Installation Instructions and Requirements:
 - a. Install materials and equipment in accordance with approved Shop Drawings and CONTRACTOR's other submittals approved by ENGINEER, the Contract Documents, and manufacturer's installation instructions. When manufacturer's installation instructions conflict with the Contract Documents, obtain interpretation or clarification from ENGINEER before proceeding.
 - b. Manufacturer's installation instructions include manufacturer's written instructions; drawings; illustrative, wiring and schematic diagrams; diagrams identifying external connections, terminal block numbers and internal wiring; and other such information pertaining to installation of materials and equipment. Included are all of manufacturer's printed installation instructions, including those that may be attached to equipment upon delivery.
 2. Prior to installing materials and equipment, complete preparation of surfaces on which materials and equipment are to be installed. Prior to installing materials and equipment on new concrete, concrete shall achieve sufficient compressive strength to support the materials and equipment.
 3. Maintain the work area in a broom-clean condition while installing materials and equipment.
 4. Use proper tools to assemble materials and equipment. Do not deform or mar surface of shafts, nuts, and other parts.
 5. Do not support rigging from building or structure without written permission of ENGINEER. CONTRACTOR is responsible for and shall repair damage to building or structure resulting from CONTRACTOR's operations, in accordance with Section 01 71 33, Protection of the Work and Property.
 6. During installation, maintain materials and equipment in neutral position and do not exert undue stress on materials and equipment.
 7. Tighten connections requiring gaskets evenly all around to ensure uniform stress over entire gasket.
 8. Use only an oil bath heater to expand couplings, gears, and other mechanical components to be expanded for installation. Do not force or drive couplings,

gears, and other mechanical components onto equipment shafts, or subject such items to open flame or torch.

9. Do not alter or repair materials and equipment and do not burn or weld materials and equipment unless required in the Contract Documents or allowed by ENGINEER.
10. Provide plugs in lubrication holes to prevent entry of foreign matter.

B. Setting and Erection:

1. Install materials and equipment plumb, level, true, and free of rack unless otherwise shown or indicated, and demonstrate plumbness and level to ENGINEER. Bring parts to proper bearing after installation and erection.
2. Anchorages:
 - a. Provide anchorage setting drawings in time to coordinate with fabrication of materials and equipment and the Work.
 - b. Anchorages shall comply with Section 05 05 33, Anchor Systems. Requests for approval of substitute materials or methods of anchorage shall be in accordance with the General Conditions, Supplementary Conditions, and Section 01 25 00, Substitution Procedures.
3. Shimming:
 - a. Wedging is not allowed.
 - b. During installation, use the minimum number of shims required for leveling the equipment.
 - c. Provide shims, filling pieces, keys, packing, grouting of the type required by the Contract Documents, and other materials and equipment necessary to properly align, level, and secure apparatus in place.
4. Installing Equipment onto Foundations:
 - a. Using experienced millwrights, carefully set and align equipment on foundations, after equipment soleplates or baseplates (as applicable) have been shimmed to true alignment at anchorages.
 - b. Set anchorages in place and tighten nuts against shims.
 - c. Check bedplates or wing feet of equipment after securing to foundations and, after confirming alignments, grout soleplates or baseplates (as applicable) in place in accordance with the Contract Documents.
5. Ream misaligned holes. Do not “force” bolts or keys.
6. Where applicable, properly align equipment with associated piping and utility connections, without exerting undue stress on connecting piping and utilities.

C. Alignment and Leveling:

1. Verify that all shafts, couplings, and sheaves are properly aligned and adjust to required tolerances.
2. Align couplings while equipment is free of external loads.
3. Check angular and parallel alignment and record actual alignment and submit to ENGINEER. Alignment shall be within tolerances specified in Contract Documents and as recommended by Supplier of the material or equipment item.

4. Use laser indicators or dial indicators for checking angular and parallel alignment. Using dial indicators requires that, during rotation of half-couplings in performing testing, dial indicator shall be maintained in same relative position, and dial indicator readings taken at same place on circumference of coupling.
- D. Threaded Connections:
1. Apply a molybdenum disulfide, anti-seize compound to threads in mechanical connections such as bolts, studs, cap screws, tubing, and other threads, unless otherwise shown or indicated.

3.2 FIELD QUALITY CONTROL

- A. Supplier's Services:
1. When specified, provide competent, qualified representatives of material or equipment Supplier to perform services required, including: supervising installation, checking the completed installation, adjusting, testing of materials and equipment, and where required instructing operations and maintenance personnel in the use and care of materials and equipment.

++ END OF SECTION ++

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 – GENERAL

1.1 SCOPE:

- A. The work under this Section includes, but is not necessarily limited to, cutting and patching work as indicated on the Drawings, herein specified and as necessary for proper and complete performance of the Work.
- B. Requirements for cutting and patching may be described in various sections of these Specifications.
- C. Execute cutting, including excavating and filling, or patching of work required to:
 - 1. Make several parts fit properly.
 - 2. Uncover work to provide for installation of ill-timed work.
 - 3. Remove and replace defective work.
 - 4. Remove and replace work not conforming to requirements of the Contract Documents.
 - 5. Remove samples of the installed work as specified for testing.
 - 6. Install specified work in existing construction.
- D. In addition, upon written instruction of the Engineer:
 - 1. Uncover work to provide for the Engineer's observation of covered work.
 - 2. Remove samples of the installed materials for testing.
 - 3. Remove work to provide for alteration of existing work.
- E. Protection of Work:
 - 1. Do not endanger any work by cutting or altering the Work or any part of it.
 - 2. Do not cut or alter the work of another contractor without written consent of the Engineer.

1.2 SUBMITTALS:

- A. Prior to cutting which affects the structural safety of the Project or the work of another contractor, submit a written notice to the Engineer requesting consent to proceed with cutting. The notice shall include:
 - 1. Identification of Project.
 - 2. Description of defective Work.
 - 3. Necessity for cutting.
 - 4. Affect on other work or on the structural integrity of the Project.

5. Description of the proposed work including:
 - a. Scope of cutting and patching
 - b. Subcontractor and trades to execute work
 - c. Products proposed to be used
 - d. Extent of refinishing
6. Alternatives to cutting and patching.
7. Designation of party responsible for the cost of cutting and patching.
- B. Cost Estimate: Prior to cutting and patching performed on instruction of the Engineer, submit a cost estimate.
- C. Should conditions of the Work or the schedule necessitate alternative materials or methods, submit a written recommendation to the Engineer that includes:
 1. Compelling conditions for alternative materials or methods.
 2. Recommended alternative materials or methods.
 3. Submittals as required for substitutions.
- D. Uncovered Work: Submit written notice to the Engineer designating the time the work will be uncovered for the Engineer's observation.

1.3 PAYMENT FOR COST:

- A. Contractor's Costs: Costs caused by ill-timed or defective work or work not conforming to the Contract Documents, including costs for additional services of the Engineer, shall be paid by the Contractor.
- B. Owner's Costs: Cost of work done as the result of the Engineer's/Owner's instructions, which is not shown on the Drawings or specified, other than defective or non-conforming work, will be paid for by the Owner.

PART 2 – PRODUCTS

2.1 MATERIALS:

- A. All products and materials shall conform to the requirements of the Specifications for the type of work being performed, except where no products are specified in these Specifications for the item being replaced; then the products and materials shall be of an equivalent type, quality, thickness and width of the item removed.

PART 3 – EXECUTION

3.1 INSPECTION:

- A. Inspect existing conditions of the Work including elements subject to movement or damage during cutting and patching, or excavating and backfilling.

- B. After uncovering work, inspect conditions affecting the installation of new products.

3.2 PREPARATION:

- A. Provide shoring, bracing and support as required to maintain structural integrity of the Project.
- B. Provide protection for other portions of the Project and provide protection from the elements.

3.3 PERFORMANCE:

- A. Execute fitting and adjustments of products to provide finished installation that complies with specified tolerances and finishes.
- B. Execute cutting and demolition by means that will prevent damage to other work and will provide proper surfaces to receive installation of repairs and new work.
- C. Execute excavating and backfilling as specified in Division 31 Earthwork.
- D. Restore work which has been cut or removed and install new products to provide completed work in accordance with the requirements of the Contract Documents.
- E. Refinish entire surfaces as necessary to provide an even finish. Continuous surfaces shall be refinished to the nearest intersection and assemblies shall be entirely refinished.

+ + END OF SECTION + +

SECTION 01 74 05

CLEANING

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes requirements for keeping the Site free of accumulations of waste materials during construction (“progress cleaning”) and cleaning for Substantial Completion and prior to final inspection (collectively, “closeout cleaning”).
2. CONTRACTOR shall perform cleaning during the Project, including progress cleaning, upon completion of the Work, and as required by the General Conditions, as may be modified by the Supplementary Conditions, and this Section.
3. Maintain in a clean manner the Site, the Work, and areas adjacent to or affected by the Work.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. NFPA 241, Safeguarding Construction, Alteration, and Demolition Operations.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PROGRESS CLEANING

A. General:

1. Clean the Site, work areas, and other areas occupied or used by CONTRACTOR not less than weekly. Dispose of materials in accordance with the General Conditions, as may be modified by the Supplementary Conditions, and the following:
 - a. Comply with NFPA 241 for removing combustible waste materials and debris.
 - b. Do not hold non-combustible waste materials at the Site more than three days if the temperature is expected to rise above 80 degrees F. When temperature is less than 80 degrees F, dispose of non-combustible materials within five days of their generation.
 - c. Provide suitable containers for storage of waste materials and debris.

- d. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately.

B. Site:

1. Keep outdoor, dust-generating areas wetted down or otherwise control dust emissions.
2. Not less than weekly, brush-sweep roadways and paved areas at the Site that are used by construction vehicles or otherwise affected by construction activities.
3. Comply with dust control requirements of Section 01 57 05, Temporary Controls, and Section 01 41 27, Earthmoving Permit and Dust Control.

C. Work Areas:

1. Clean areas where the Work is in progress to maintain the extent of cleanliness necessary for proper execution of the Work.
2. Remove liquid spills promptly. Immediately report spills to OWNER, ENGINEER, and authorities having jurisdiction, in accordance with the Contract Documents and Laws and Regulations.
3. Where dust would impair proper execution of the Work, broom-clean or vacuum entire work area, as appropriate.
4. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

D. Installed Work:

1. Keep installed Work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of material or equipment installed, using only cleaning agents and methods specifically recommended by material or equipment manufacturer. If manufacturer does not recommend specific cleaning agents or methods, use cleaning agents and methods that are not hazardous to health and property and that will not damage exposed surfaces.

E. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration until Substantial Completion.

F. Cutting and Patching:

1. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, trailings and cuttings, and similar materials.
2. Thoroughly clean piping, conduits, and similar features before applying patching material, paint, or other finishing materials. Restore damaged coverings on piping, ducting, and similar items to its pre-construction condition.

G. Cleaning of Hydraulic Structures: Clean hydraulic structures that will contain fluid, such as tanks and channels, in accordance with this Section and Section 01 45 53, Cleaning, Testing, and Disinfecting Hydraulic Structures.

H. Waste Disposal:

1. Properly dispose of waste materials, surplus materials, debris, and rubbish off the Site.
 2. Do not burn or bury rubbish and waste materials at the Site.
 3. Do not discharge volatile or hazardous substances, such as mineral spirits, oil, or paint thinner, into any water on site including raw water, finished water, storage ponds, reservoirs, storm sewers or sanitary sewers.
 4. Do not discharge wastes into surface waters or drainage routes.
 5. CONTRACTOR is solely responsible for complying with Laws and Regulations regarding storing, transporting, and disposing of waste generated by CONTRACTOR's operations or brought to the Site by CONTRACTOR.
- I. During handling and installation of materials and equipment, clean and protect construction in progress and adjoining materials and equipment already in place. Apply protective covering where required for protection from damage or deterioration, until Substantial Completion.
- J. Clean completed construction as frequently as necessary throughout the construction period.

3.2 CLOSEOUT CLEANING

- A. Complete the following prior to requesting inspection for Substantial Completion:
1. Clean and remove from the Site rubbish, waste material, debris, and other foreign substances.
 2. Sweep paved areas broom-clean. Remove petrochemical spills, stains, and other foreign deposits.
 3. Hose-clean sidewalks and loading areas.
 4. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 5. Leave parking areas, surface waterways, drainage routes, storm sewers, and gutters open and clean.
 6. Repair pavement, roads, sod, and other areas affected by construction operations and restore to specified condition; if condition is not specified, restore to pre-construction condition.
 7. Clean exposed exterior and interior hard-surfaced finishes to dirt-free condition, free of spatter, grease, stains, fingerprints, films, and similar foreign substances.
 8. Clean, wax, and polish wood, vinyl, and painted floors.
 9. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, and similar spaces.
 10. In unoccupied spaces, sweep concrete floors broom-clean.
 11. Clean transparent materials, including mirrors and glazing in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
 12. Remove non-permanent tags and labels.
 13. Surface Finishes:

- a. Touch-up and otherwise repair and restore chipped, scratched, dented or otherwise marred surfaces to specified finish and match adjacent surfaces.
 - b. Do not paint over “UL” or similar labels, including mechanical and electrical nameplates, identification, manufacturer, and safety nameplates.
 - 14. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint, and mortar droppings, and other foreign substances.
 - 15. Clean plumbing fixtures to sanitary condition, free of stains, including stains resulting from water exposure.
 - 16. Leave the Site clean, and in neat, orderly condition, satisfactory to OWNER and ENGINEER.
- B. Complete the following prior to requesting final inspection:
- 1. Following completion of the Work on the “punch list” of Work uncompleted at Substantial Completion, clean in accordance with Paragraph 3.2.A of this Section.

+ + END OF SECTION + +

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall comply with the requirements and procedures for construction waste management and disposal, including:
 - a. Minimizing construction waste and debris and reusing, salvaging, and recycling to specified extent.
2. Extent of required construction waste management and disposal includes:
 - a. Construction waste management disposal within the Project limits, as shown, required, or indicated at the project locations.

B. Coordination:

1. Coordinate salvaging, recycling, and disposing of waste as specified under this and other Sections.

C. Related Sections:

1. Section 01 31 13, Project Coordination

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from the Site and properly dispose of waste in facility such as permitted landfill or incinerator or other method acceptable to authorities having jurisdiction.
 1. Except as otherwise specified, remove from the Site all waste and debris from the Work as it accumulates. Upon completion of the Work, remove materials, equipment, waste, and debris and leave the Site clean, neat, and orderly. Comply with the Contract Documents regarding cleaning and removal of trash, debris, and waste.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Disposal: Transport waste materials to proper location at site other than OWNER's property for disposal in accordance with Laws and Regulations.

++ END OF SECTION ++

SECTION 01 75 11

CHECKOUT AND STARTUP PROCEDURES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall initially start up and place equipment installed under the Contract into successful operation, in accordance with the equipment manufacturer's written instructions and as instructed by Supplier at the Site.
2. General Activities Include:
 - a. Cleaning, as required under other provisions of the Contract Documents.
 - b. Removing temporary protective coatings.
 - c. Checking and correcting (if necessary) leveling plates, grout, bearing plates, anchorage devices, fasteners, and alignment of piping, conduits, and ducts that may place stress on the connected equipment.
 - d. Testing operation of instruments, control panel, PLC controls.

B. Coordination:

1. Coordinate checkout and start-up with other contractors, as necessary.
2. Do not start up system or subsystem for continuous operation until all components of that system or subsystem, including instrumentation and controls, have been tested to the extent practicable and proven to be operable as intended by the Contract Documents.
3. OWNER will provide sufficient personnel to assist CONTRACTOR in starting up equipment, but responsibility for proper operation is CONTRACTOR's.
4. Supplier shall be present during checkout, start-up, and when equipment is initially started up and placed into operation, unless otherwise acceptable to ENGINEER.

C. OWNER's Assumption of Responsibility for Equipment and Systems:

1. OWNER will assume responsibility for the equipment upon Substantial Completion.
 2. Prior to turning over to OWNER responsibility for operating and maintaining system or equipment:
 - a. Complete system field quality control testing in accordance with the Contract Documents.
 - b. Submit acceptable final operations and maintenance manuals in accordance with Section 01 78 23, Operations and Maintenance Data.
 - c. Obtain from ENGINEER final certificate of Substantial Completion for either entire Work or the portion being turned over to OWNER.
- D. CONTRACTOR's Continuation of Responsibility for Equipment and Systems:
1. After Substantial Completion and in conjunction with the start-up and initial operation of the equipment, CONTRACTOR shall complete the required Field Test demonstrating all instrumentation and control system equipment and systems are running and fully operational for a continuous 48 hour period.

1.2 SUBMITTALS

- A. Closeout Submittals: Submit the following:
1. Certifications:
 - a. Supplier's certification of installation in accordance with Paragraph 3.1.B of this Section.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 SERVICES OF SUPPLIER

- A. When specified, furnish services of competent, qualified representatives of material and equipment manufacturers as specified, including supervising installation, adjusting, checkout, start-up, and testing of materials and equipment.
- B. Certification:
1. When services by Supplier are required at the Site, within 14 days after first test operation of equipment, submit to ENGINEER a letter from Supplier, on Supplier's letterhead, stating that materials and equipment are installed in accordance with Supplier's requirements and installation instructions, and in accordance with the Contract Documents.

2. In lieu of Supplier letter, submit completed form attached to this Section.
3. Include in the final operations and maintenance manual for the associated equipment a copy of the letter or completed form, as applicable.

3.2

A. Valves:

1. Inspect manual and automatic control valves, and clean bonnets and stems.
2. Tighten packing glands to ensure no leakage, but allow valve stems to operate without galling.
3. Replace packing in valves to retain maximum adjustment after system is determined to be complete.
4. Replace packing on valves that continue to leak.
5. Remove and repair bonnets that leak.
6. After cleaning, coat packing gland threads and valve stems with surface preparation of "Molycote" or "Fel-Pro".

B. Tighten flanges and other pipe joints after system has been placed in operation. Replace gaskets that show signs of leakage after tightening.

C. Inspect all joints for leakage:

1. Promptly remake each joint that appears to be faulty; do not wait for rust or other corrosion to form.
2. Clean threads on both parts, and apply compound and remake joints.

D. Excess Gasses and Fluids:

1. Vent gasses trapped in systems.
2. Verify that liquids are drained from all parts of gas or air systems.

3.3 ATTACHMENTS

A. The attachment listed below, following the "End of Section" designation, is a part of this Specification Section.

1. Supplier's Installation Certification Form (one page).

++ END OF SECTION ++

SUPPLIER'S INSTALLATION CERTIFICATION

Contract No. and Name: _____

Equipment Specification Section: _____

Equipment Name: _____

Contractor: _____

Manufacturer of Equipment: _____

The undersigned Supplier of the equipment described above hereby certifies that Supplier has checked the equipment installation and that the equipment, as specified in the Contract Documents, has been provided in accordance with the manufacturer's recommendations and the Contract Documents, and that the trial operation of the equipment has been satisfactory.

Comments: _____

Date

Supplier Name (print)

Signature of Supplier

Date

Contractor Name (print)

Signature of Contractor

SECTION 01 77 19
CLOSEOUT REQUIREMENTS

PART 1 – GENERAL

1.1 GENERAL

- A. Scope:
 - 1. Section Includes.
 - a. Substantial Completion.
 - b. Final inspection.
 - c. Request for final payment.

1.2 SUBSTANTIAL COMPLETION

- A. Procedures for requesting and documenting Substantial Completion are in the General Conditions, as may be modified by the Supplementary Conditions.

1.3 FINAL INSPECTION

- A. Procedures for requesting and documenting the final inspection are in the General Conditions, as may be modified by the Supplementary Conditions.

1.4 REQUEST FOR FINAL PAYMENT

- A. Procedure:
 - 1. Submit request for final payment in accordance with the Agreement General Conditions, as may be modified by the Supplementary Conditions.
- B. Request for final payment shall include:
 - 1. Documents required for progress payments.
 - 2. Documents required in the General Conditions, as may be modified by the Supplementary Conditions.
 - 3. Releases or Waivers of Lien Rights:
 - a. When submitting releases or waivers of Lien rights, provide release or waiver by CONTRACTOR and each Subcontractor and Supplier that provided CONTRACTOR with labor, material, or equipment totaling \$1,000 or more.
 - b. Provide list of Subcontractors and Suppliers for which release or waiver of Lien is required.

- c. Each release or waiver of Lien shall be signed by an authorized representative of the entity submitting release or waiver to CONTRACTOR, and shall include Subcontractor's or Supplier's corporate seal, when applicable.
 - d. Release or waiver of Lien may be conditional upon receipt of final payment.
- 4. Refer to the General Conditions and Supplementary Conditions regarding final payment documentation requirements.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 78 23

OPERATIONS AND MAINTENANCE DATA

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. Submit operation and maintenance data, in accordance with this Section and in accordance with requirements elsewhere in the Contract Documents, as instructional and reference manuals by operations and maintenance personnel at the Site.
2. Required operation and maintenance data are listed in the Contract Documents. If not otherwise listed, at minimum, submit operation and maintenance data for:
 - a. All equipment and systems.
 - b. Valves, gates, actuators, and related accessories.
 - c. Instrumentation and control equipment .
 - d. Electrical gear.
3. For each operation and maintenance manual, submit the following:
 - a. Preliminary Submittal: Printed and bound copy of and electronic copies of entire operation and maintenance manual, except for test data and service reports by Supplier.
 - b. Final Submittal: Printed and bound copy and electronic copies of complete operations and maintenance manual, including test data and service reports by Supplier, with electronic copies.

1.2 SUBMITTALS

A. Closeout Submittals: Submit the following:

1. Operation and Maintenance Data
 - a. Submit the operations and maintenance data as required by the Contract Documents.

B. Quantity Required and Timing of Submittals:

1. Preliminary Submittal:
 - a. Electronic Copies: one copy provided to the ENGINEER, and Owner, exclusive of copies required by CONTRACTOR.
 - b. Submit to ENGINEER by the earlier of: ninety days following approval of Shop Drawings and product data

submittals, or thirty days prior to starting training of operations and maintenance personnel, or thirty days prior to field quality control testing at the Site.

2. Final Submittal: Provide final submittal prior to Substantial Completion, unless submittal is specified as required prior to an interim Milestone.
 - a. Printed Copies: one copy to be provided to OWNER.
 - b. Electronic Copies: one copy to be provided to the OWNER.

1.3 FORMAT OF PRINTED COPIES

A. Binding and Cover:

1. Bind each operation and maintenance manual in durable, permanent, stiff-cover binder(s), comprising one or more volumes per copy as required. Binders shall be minimum one-inch wide and maximum of three-inch wide. Binders for each copy of each volume shall be identical.
2. Binders shall be locking three-ring/"D"-ring type, or three-post type. Three-ring binders shall be riveted to back cover and include plastic sheet lifter (page guard) at front of each volume.
3. Do not overfill binders.
4. Covers shall be oil-, moisture-, and wear-resistant, including identifying information on cover and spine of each volume.
5. Provide the following information on cover of each volume:
 - a. Title: "OPERATING AND MAINTENANCE INSTRUCTIONS".
 - b. Name or type of material or equipment covered in the manual.
 - c. Volume number, if more than one volume is required, listed as "Volume ___ of ___", with appropriate volume-designating numbers filled in.
 - d. Name of Project and, if applicable, Contract name and number.
 - e. Name of building or structure, as applicable.
6. Provide the following information on spine of each volume:
 - a. Title: "OPERATING AND MAINTENANCE INSTRUCTIONS".
 - b. Name or type of material or equipment covered in the manual.

- c. Volume number, if more than one volume is required, listed as “Volume __ of __”, with appropriate volume-designating numbers filled in.
- d. Project name and building or structure name.

B. Pages:

- 1. Print pages in manual on 30-pound (minimum) paper, 8.5 inches by 11 inches in size.
- 2. Reinforce binding holes in each individual sheet with plastic, cloth, or metal. When published, separately-bound booklets or pamphlets are part of the manual, reinforcing of pages within booklet or pamphlet is not required.
- 3. Provide each page with binding margin at least one inch wide. Punch each page with holes suitable for the associated binding.

C. Drawings:

- 1. Bind into the manual drawings, diagrams, and illustrations up to and including 11 inches by 17 inches in size, with reinforcing specified for pages.
- 2. Documents larger than 11 inches by 17 inches shall be folded and inserted into clear plastic pockets bound into the manual. Mark pockets with printed text indicating content and drawing numbers. Include no more than three drawing sheets per pocket.

D. Copy Quality and Document Clarity:

- 1. Contents shall be original-quality copies. Documents in the manual shall be either original manufacturer-printed documents or first-generation photocopies indistinguishable from originals. If original is in color, copies shall be in color. Manuals that contain copies that are unclear, not completely legible, off-center, skewed, or where text or drawings are cut by binding holes, are unacceptable. Pages that contain approval or date stamps, comments, or other markings that cover text or drawing are unacceptable. Faxed copies are unacceptable.
- 2. Clearly mark in ink to indicate all components of materials and equipment on catalog pages for ease of identification. In standard or pre-printed documents, indicate options furnished or cross out inapplicable content. Using highlighters to so indicate options furnished is unacceptable.

E. Organization:

- 1. Coordinate with ENGINEER and OWNER to develop comprehensive, practical, and consistent indexing system for operations and maintenance data. ENGINEER will review indexing system before operations and maintenance data is submitted.

2. Table of Contents:
 - a. Provide table of contents in each volume of each operations and maintenance manual.
 - b. In table of contents and at least once in each chapter or section, identify materials and equipment by their functional names. Thereafter, abbreviations and acronyms may be used if their meaning is clearly indicated in a table bound at or near beginning of each volume. Using material or equipment model or catalog designations for identification is unacceptable.
3. Use dividers and indexed tabs between major categories of information, such as operating instructions, preventive maintenance instructions, and other major subdivisions of data in each manual.

1.4 FORMAT OF ELECTRONIC COPIES

A. Electronic Copies of Operation and Maintenance Manuals:

1. Each electronic copy shall include all information included in the corresponding printed copy. Cover page shall include the following:
 - a. Title: "OPERATING AND MAINTENANCE INSTRUCTIONS".
 - b. Name or type of material or equipment covered in the manual.
 - c. Project name and building or structure name.
2. Include drawings, diagrams, and illustrations up to and including 11 inches by 17 inches in size.
3. Clearly mark to indicate all components of materials and equipment on catalog pages for ease of identification. In standard documents, indicate options furnished or cross out inapplicable content.
4. Coordinate with ENGINEER and OWNER to develop comprehensive practical, and consistent indexing system for operations and maintenance data. ENGINEER will review indexing system before operations and maintenance data is submitted.
5. Table of Contents:
 - a. Provide table of contents in each operations and maintenance manual.
 - b. In table of contents and at least once in each chapter or section, identify materials and equipment by their functional names. Thereafter, abbreviations and acronyms may be used if their meaning is clearly indicated in a table included at or

near beginning of each manual. Using material or equipment model or catalog designations for identification is unacceptable.

6. Submit each electronic copy on a separate compact disc (CD), or flashdrive, unless another electronic data transfer method or format is acceptable to ENGINEER.
7. File Format:
 - a. Files shall be in “portable document format” (PDF). Files shall be electronically searchable; the use of scanned pages is to be minimized and is subject to ENGINEER approval.
 - b. Submit separate file for each separate document in the printed copy.
 - c. Within each file, provide bookmarks for the following:
 - 1) Each chapter and subsection listed in the corresponding printed copy document’s table of contents.
 - 2) Each figure.
 - 3) Each table.
 - 4) Each appendix.

B. Copies of Programming and Configuration Files:

1. Provide on CD copy of all software programming, such as programmable logic controller programs, prepared specifically for the Project. Third-party, licensed, commercially available software is excluded from requirements of this Article; submit copies of commercially-available, licensed, third-party software, where required, in accordance with the Contract Documents.
2. Submit on CD copies of system configuration prepared specifically for the Project, such as plant monitoring system and SCADA display configurations.
3. Submit programming and configuration files together with electronic copies of operation and maintenance data.

1.5 CONTENT

A. General:

1. Prepare each operations and maintenance manual specifically for the Project.
Include in each manual all pertinent instructions, as-built drawings as applicable, bills of materials, technical bulletins, installation and handling requirements, maintenance and repair instructions, and

other information required for complete, accurate, and comprehensive data for safe and proper operation, maintenance, and repair of materials and equipment furnished for the Project. Include in manuals specific information required in the Specification Section for the material or equipment, data required by Laws and Regulations, and data required by authorities having jurisdiction.

2. Completeness and Accuracy:

- a. Operation and maintenance manuals that include language stating or implying that the manual's content may be insufficient or stating that the manual's content is not guaranteed to be complete and accurate are unacceptable.
- b. Operations and maintenance manuals shall be complete and accurate.
- c. Operation and maintenance manuals shall indicate the specific alternatives and features furnished, and the specific operation and maintenance provisions for the material or equipment furnished.

3. Submit complete, detailed written operating instructions for each material or equipment item including: function; operating characteristics; limiting conditions; operating instructions for start-up, normal and emergency conditions; regulation and control; operational troubleshooting; and shutdown. Also include, as applicable, written descriptions of alarms generated by equipment and proper responses to such alarm conditions.

B. Submit written explanations of all safety considerations relating to operation and maintenance procedures.

C. Submit complete, detailed, written preventive maintenance instructions including all information and instructions to keep materials, equipment, and systems properly lubricated, adjusted, and maintained so that materials, equipment, and systems function economically throughout their expected service life. Instructions shall include:

1. Written explanations with illustrations for each preventive maintenance task such as inspection, adjustment, lubrication, calibration, and cleaning. Include pre-startup checklists for each equipment item and maintenance requirements for long-term shutdowns.
2. Recommended schedule for each preventive maintenance task.
3. Lubrication charts indicating recommended types of lubricants, frequency of application or change, and where each lubricant is to be used or applied.
4. Table of alternative lubricants.

5. Troubleshooting instructions.
 6. List of required maintenance tools and equipment.
- D. Submit complete bills of material or parts lists for materials and equipment furnished. Lists or bills of material may be furnished on a per-drawing or per-equipment assembly basis. Bills of material shall indicate:
1. Manufacturer's name, address, telephone number, fax number, and Internet website address.
 2. Manufacturer's local service representative's or local parts supplier's name, address, telephone number, fax number, Internet website address, and e-mail addresses, when applicable.
 3. Manufacturer's shop order and serial number(s) for materials, equipment or assembly furnished.
 4. For each part or piece include the following information:
 - a. Parts cross-reference number. Cross-reference number shall be used to identify the part on assembly drawings, Shop Drawings, or other type of graphic illustration where the part is clearly shown or indicated.
 - b. Part name or description.
 - c. Manufacturer's part number.
 - d. Quantity of each part used in each assembly.
 - e. Current unit price of the part at the time the operations and maintenance manual is submitted. Price list shall be dated.
- E. Submit complete instructions for ordering replaceable parts, including reference numbers (such as shop order number or serial number) that will expedite the ordering process.
- F. Submit manufacturer's recommended inventory levels for spare parts, extra stock materials, and consumable supplies for the initial two years of operation. Consumable supplies are items consumed or worn by operation of materials or equipment, and items used in maintaining the operation of material or equipment, including items such as lubricants, seals, reagents, and testing chemicals used for calibrating or operating the equipment. Include estimated delivery times, shelf life limitations, and special storage requirements.
- G. Submit manufacturer's installation and operation bulletins, diagrams, schematics, and equipment cutaways. Avoid submitting catalog excerpts unless they are the only document available showing identification or description of particular component of the equipment. Where materials pertain to multiple models or types, mark the literature to indicate specific material or equipment supplied. Marking may be in the form of checking, arrows, or underlining to indicate pertinent information, or by crossing out or

other means of obliterating information that does not apply to the materials and equipment furnished.

- H. Submit original-quality copies of each approved and accepted Shop Drawing, product data, and other submittal, updated to indicate as-installed condition. Reduced drawings are acceptable only if reduction is to not less than one-half original size and all lines, dimensions, lettering, and text are completely legible on the reduction.
- I. Submit complete electrical schematics and wiring diagrams, including complete point-to-point wiring and wiring numbers or colors between all terminal points.
- J. Programmable Logic Controllers: If programmable logic controllers are furnished under the Contract:
 - 1. Submit complete logic listings in ladder logic format.
 - 2. Format Requirements:
 - a. For ladder diagram logic, include complete cross-referencing of all logic elements. Annotate all elements with clearly understandable tags or descriptive labels.
 - 3. Submit complete programmable logic controller listing of all input/output address assignments, tag assignments, and pre-set constant values, with functional point descriptions.
 - 4. Submit complete manufacturer's programming manuals.
- K. Submit copy of warranty bond and service contract as applicable.
- L. When copyrighted material is used in operations and maintenance manuals, obtain copyright holder's written permission to use such material in the operation and maintenance manual.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

++ END OF SECTION ++

SECTION 01 78 36

WARRANTIES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This section describes general requirements for warranties required in the various Specifications.
2. Provisions on the Contract's correction period, CONTRACTOR'S general warranty and guarantee, and CONTRACTOR's warranty of title are in the General Conditions, as may be modified by the Supplementary Conditions.
3. This section includes general requirements for:
 - a. Suppliers' standard warranties.
 - b. Suppliers' special warranties.
 - c. Implied warranties.
 - d. Commencement and duration of warranties.

1.2 SUBMITTALS

A. General:

1. For each item of equipment furnished under the Contract, submit Supplier's standard warranty, regardless of whether such warranty or submittal thereof is required by the associated Specifications for that item. Submit such warranties for materials where such submittal is required in the Specifications for the material.
2. For each item of material or equipment where Supplier's special (or extended) warranty is required by the Contract Documents, submit appropriate special warranty that complies with the Contract Documents.
3. Supplier's warranties shall be specifically endorsed solely to OWNER by the entity issuing such warranty.
4. Submit Suppliers' standard warranties and special warranties as submittals in accordance with Schedule of Submittals accepted by ENGINEER.

1.3 SUPPLIERS' WARRANTIES FOR MATERIALS AND EQUIPMENT

A. Warranty Types:

1. Required by the General Conditions:
 - a. Warranties specified for materials and equipment shall be in addition to, and run concurrent with, CONTRACTOR's general warranty and guarantee and requirements for the Contract's correction period.
 - b. Disclaimers and limitations in specific materials and equipment warranties do not limit CONTRACTOR's general warranty and guarantee, nor does such affect or limit CONTRACTOR's performance obligations under the correction period.
 2. Material or equipment manufacturer's standard warranty is pre-printed, written warranty published by item's manufacturer and specifically endorsed by manufacturer to OWNER.
 3. Special warranty is written warranty that either extends the duration of material or equipment manufacturer's standard warranty or provides other, increased rights to OWNER. Where the Contract Documents indicate specific requirements for warranties that differ from the manufacturer's standard warranty for that item, special warranty is implied.
- B. Requirements for Special Warranties:
1. Submit written special warranty document that contains appropriate provisions and identification, ready for execution by material or equipment manufacturer and OWNER. Submit draft warranty with submittals required prior to fabrication and shipment of the item from the Supplier's facility.
 2. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed by product manufacturer and other entities as appropriate.
 3. Specified Form: When specified forms for special warranties are included in the Contract Documents, prepare written document, properly executed by item manufacturer and OWNER, using the required form.
 4. Refer to the Specifications for content and requirements for submitting special warranties.

1.4 IMPLIED WARRANTIES

- A. Warranty of Title and Intellectual Property Rights:
1. Except as may be otherwise indicated in the Contract Documents, implied warranty of title required by Laws and Regulations is applicable to the Work and to materials and equipment incorporated therein.

2. Provisions on intellectual property rights, including patent fees and royalties, are in the General Conditions, as may be modified by the Supplementary Conditions.
- B. Warranty of Merchantability:
 1. Notwithstanding any other provision of the Contract to the contrary, implied warranties of merchantability required by Laws and Regulations apply to the the materials and equipment incorporated into the Work.
- C. Warranty of Fitness-for-Purpose:
 1. When Supplier is aware of, or has reason to be aware of, specified materials or features of the Work that are contrary to the intended use, purpose, service, application, or environment in which the material or equipment item will be used, submit request for interpretation in accordance with Section 01 26 00, Contract Modification Procedures. Where appropriate, such request for interpretation shall indicate the apparent discrepancy and propose appropriate, alternative materials or equipment.

1.5 COMMENCEMENT AND DURATION OF WARRANTIES

- A. Commencement of Warranties:
 1. Contract correction period and CONTRACTOR's general warranty commence as indicated in the General Conditions, as may be modified by the Supplementary Conditions.
 2. Suppliers' general warranties and special warranties commence running on the date that the associated item is certified by ENGINEER as substantially complete. In no event shall special warranties commence running prior to ENGINEER's review and acceptance of special warranty submittal for the item.
 3. Implied warranties commence in accordance with Laws and Regulations.
- B. Duration of Warranties:
 1. Duration of correction period is in accordance with the General Conditions, as may be modified by the Supplementary Conditions.
 2. Duration of CONTRACTOR's general warranty and guarantee is in accordance with Laws and Regulations.
 3. Duration of Suppliers' general warranties is in accordance with the applicable general warranty document accepted by ENGINEER.
 4. Duration of required Suppliers' special warranties shall be in accordance with the requirements of the Contract Documents for the subject item.

5. Duration of implied warranties shall be in accordance with Laws and Regulations.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.1 DESCRIPTION

- A. CONTRACTOR shall maintain and submit to ENGINEER with record documents in accordance with the Specifications, General Conditions, and Supplementary Conditions.
- B. Maintenance of Record Documents:
 - 1. Maintain in CONTRACTOR's field office, in clean, dry, legible condition, complete sets of the following record documents: Drawings, Specifications, and Addenda; Shop Drawings, Samples, and other CONTRACTOR submittals, including records of test results, approved or accepted as applicable, by ENGINEER; Change Orders, Work Change Directives, Field Orders, photographic documentation, survey data, and all other documents pertinent to the Work.
 - 2. Provide files and racks for proper storage and easy access to record documents. File record documents in accordance with the edition of the Construction Specification Institute's "Master Format" used for organizing the Project Manual, unless otherwise accepted by ENGINEER.
 - 3. Make record documents available for inspection upon request of ENGINEER or OWNER.
 - 4. Do not use record documents for purpose other than serving as Project record. Do not remove record documents from CONTRACTOR's field office without ENGINEER's approval.
- C. Submittal of Record Documents:
 - 1. Submit to ENGINEER the following record documents:
 - a. Drawings.
 - b. Project Manual including Specifications and Addenda (bound).
 - 2. Prior to readiness for final payment, submit to ENGINEER one copy of final record documents. Submit complete record documents; do not make partial submittals.
 - 3. Submit record documents with transmittal letter on CONTRACTOR letterhead complying with letter of transmittal requirements in Section 01 33 00, Submittal Procedures.

4. Record documents submittal shall include notarized certification, with original signature of official authorized to execute legal agreements on behalf of CONTRACTOR, reading as follows:

“[Insert Contractor’s corporate name] has maintained and submitted record documentation in accordance with the General Conditions and Supplementary Conditions, Section 01 78 39, Project Record Documents, and other elements of Contract Documents, for the WTP Alum Upgrades project . We certify that each record document submitted is complete, accurate, and legible relative to the Work performed under our Contract, and that the record documents comply with the requirements of the Contract Documents.

[Provide signature, print name, print signing party’s corporate title, and date]”

1.2 RECORDING CHANGES

A. General:

1. At the start of the Project, label each record document to be submitted as, “PROJECT RECORD” using legible, printed letters. Letters on record copy of the Drawings shall be two inches high.
2. Keep record documents current. Make entries on record documents within two working days of receipt of information required to record the change.
3. Do not permanently conceal the Work until required information has been recorded.
4. Accuracy of record documents shall be such that future searches for items shown on the record documents may rely reasonably on information obtained from ENGINEER-accepted record documents.
5. Marking of Entries:
 - a. Use erasable, colored pencils (not ink or indelible pencil) for marking changes, revisions, additions, and deletions to record documents.
 - b. Clearly describe the change by graphic line and make notations as required. Use straight-edge to mark straight lines. Writing shall be legible and sufficiently dark to allow scanning of record documents into legible electronic files.
 - c. Date all entries on record documents.
 - d. Call attention to changes by drawing a “cloud” around the change(s) indicated.

- e. Mark initial revisions in red. In the event of overlapping changes, use different colors for subsequent changes.

B. Drawings:

1. Record changes on copy of the Drawings. Submittal of CONTRACTOR-originated or -produced drawings as a substitute for recording changes on the Drawings is unacceptable.
2. Record changes on plans, sections, schematics, and details as required for clarity, making reference dimensions and elevations (to Project datum) for complete record documentation.
3. Record actual construction including:
 - a. Depths of various elements of foundation relative to Project datum.
 - b. Horizontal and vertical location of Underground Facilities referenced to permanent surface improvements. For each Underground Facility, including pipe fittings, provide dimensions to at least two permanent, visible surface improvements.
 - c. Location of exposed utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.
 - d. Changes in structural and architectural elements of the Work, including changes in reinforcing.
 - e. Field changes of dimensions, arrangements, and details.
 - f. Changes made in accordance with Change Orders, Work Change Directives, and Field Orders.
 - g. Changes in details on the Drawings. Submit additional details prepared by CONTRACTOR when required to document changes.
4. Recording Changes for Schematic Layouts:
 - a. In some cases, on the Drawings, arrangements of conduits, circuits, piping, ducts, and similar items are shown schematically and are not intended to portray physical layout. For such cases, the final physical arrangement shall be determined by CONTRACTOR subject to acceptance by ENGINEER.
 - b. Record on record documents all revisions to schematics on Drawings, including piping schematics, ducting schematics, process and instrumentation diagrams, control and circuitry diagrams, electrical one-line diagrams, motor control center

layouts, and other schematics when included in the Contract. Record actual locations of equipment, lighting fixtures, in-place grounding system, and other pertinent data.

- c. When dimensioned plans and dimensioned sections on the Drawings show the Work schematically, indicate on the record documents, by dimensions accurate to within one inch in the field, centerline location of items of Work such as conduit, piping, ducts, and similar items
 - 1) Clearly identify the Work item by accurate notations such as “cast iron drain”, “rigid electrical conduit”, “copper waterline”, and similar descriptions.
 - 2) Show by symbol or note the vertical location of Work item; for example, “embedded in slab”, “under slab”, “in ceiling plenum”, “exposed”, and similar designations. For piping not embedded, also provide elevation dimension relative to Project datum.
 - 3) Descriptions shall be sufficiently detailed to be related to Specifications.
- d. ENGINEER may furnish written waiver of requirements relative to schematic layouts shown on plans and sections when, in ENGINEER’s judgment, dimensioned layouts of Work shown schematically will serve no useful purpose. Do not rely on waiver(s) being issued.

5. Supplemental Drawings:

- a. In some cases, drawings produced during construction by ENGINEER or CONTRACTOR supplement the Drawings and shall be included with record documents submitted by CONTRACTOR. Supplemental record drawings shall include drawings provided with Change Orders, Work Change Directives, and Field Orders and that cannot be incorporated into the Drawings due to space limitations.
- b. Supplemental drawings provided with record drawings shall be integrated with the Drawings and include necessary cross-references between drawings. Supplemental record drawings shall be on sheets the same size as the Drawings.
- c. When supplemental drawings developed by CONTRACTOR using computer-aided drafting/design

(CADD) software are to be included in record drawings, submit electronic files for such drawings in AutoCAD 2014 format as part of record drawing submittal. Submit electronic files on compact disc or flash drive labeled, "Supplemental Record Drawings", together with CONTRACTOR name, Project name, and Contract name and number.

C. Specifications and Addenda:

1. Mark each Section to record:
 - a. Manufacturer, trade name, catalog number, and Supplier of each product and item of equipment actually provided.
 - b. Changes made by Addendum, Change Orders, Work Change Directives, and Field Orders.

1.3 ELECTRONIC FILES FURNISHED BY ENGINEER

A. CADD files will be furnished by ENGINEER upon the following conditions:

1. CONTRACTOR shall submit to ENGINEER a letter on CONTRACTOR letterhead requesting CADD files and providing specific definition(s) or description(s) of how files will be used, and specific description of benefits to OWNER (including credit proposal, if applicable) if the request is granted.
2. CONTRACTOR shall execute ENGINEER's standard agreement for release of electronic files and shall abide by all provisions of the agreement for release of electronic files.
3. Layering system incorporated in CADD files shall be maintained as transmitted by ENGINEER. CADD files transmitted by ENGINEER containing cross-referenced files shall not be bound by CONTRACTOR. Drawing cross-references and paths shall be maintained. If CONTRACTOR alters layers or cross-reference files, CONTRACTOR shall restore all layers and cross-references prior to submitting record documents to ENGINEER.
4. CONTRACTOR shall submit record drawings to ENGINEER in same CADD format that files were furnished to CONTRACTOR.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 78 43

SPARE PARTS AND EXTRA MATERIALS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes administrative and procedural requirements for furnishing spare parts, extra materials, maintenance supplies, and special tools required for maintenance (collectively, “spare parts and extra materials”) required by the Contract Documents.
2. CONTRACTOR shall furnish spare parts, extra materials, and associated information, for materials and equipment furnished in accordance with the Contract Documents. Furnish such items in accordance with the requirements of this Section and the Specifications sections in which such items are indicated.
3. CONTRACTOR shall be fully responsible for loss and damage to spare parts and extra materials until such items are received by OWNER’s facility manager.
4. Promptly replace spare parts and extra materials furnished by OWNER to CONTRACTOR for use in remedying defective Work.

B. List of Spare Parts and Extra Materials:

1. With the Shop Drawings and product data submittals for each Specifications section, submit a complete listing of spare parts and extra materials required for maintenance for two years of operation, together with unit prices in current United States funds, and local source(s) of supply for each.
2. Also include listing of spare parts and extra materials, with pricing and sources, in the operations and maintenance data submitted in accordance with Section 01 78 23, Operations and Maintenance Data.

1.2 SUBMITTALS

A. Maintenance Material Submittals: Submit the following:

1. Spare Parts and Extra Materials:
 - a. Furnish to OWNER in accordance with requirements of this Section, and the Specifications section in which the spare parts and extra materials are specified.
2. Transfer Documentation: For each delivery of spare parts and extra materials, submit to ENGINEER the following:
 - a. Submit, on CONTRACTOR’s letterhead, a letter of transmittal for spare parts and extra materials furnished under each Specifications section.

Letter of transmittal shall accompany spare parts and extra materials. Do not furnish letter of transmittal separate from associated spare parts and extra materials.

- b. Furnish three original, identical, signed letters of transmittal for each delivery of spare parts and extra materials furnished under each Specifications section. Upon delivery of specified quantities and types of spare parts and extra materials to OWNER, designated person from OWNER will countersign each original letter of transmittal indicating OWNER's receipt of spare parts and extra materials in the quantity, type, and quality required by the Contract Documents. OWNER will retain one fully-signed original, CONTRACTOR shall submit one fully-signed original to ENGINEER. CONTRACTOR shall retain one fully-signed original for CONTRACTOR's records.
- c. Letter of transmittal shall include the following:
 - 1) Information required for letters of transmittal in Section 01 33 00, Submittal Procedures.
 - 2) Transmittal shall list spare parts and extra materials furnished under each Specifications Section. List each individual part, material, equipment item, tool, and product and the associated quantity furnished.
 - 3) Include space for countersignature by OWNER as follows: space for signature, space for printed name, and date.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Packaging and Labeling of Spare Parts and Extra Materials:
 - 1. Furnish spare parts and extra materials in manufacturer's unopened cartons, boxes, crates, or other original, protective covering suitable for preventing corrosion and deterioration for maximum length of storage normally anticipated by manufacturer.
 - 2. Packaging of spare parts and extra materials shall be clearly marked and identified with name of manufacturer, applicable material or equipment, part number, part description, and part location in the equipment or system.
 - 3. Protect and package spare parts and extra materials for maximum shelf life normally anticipated by manufacturer.
- B. Storage Prior to Delivery to Owner:
 - 1. Prior to furnishing spare parts and extra materials to OWNER, store spare parts and extra materials in accordance with the Contract Documents and manufacturers' recommendations.
- C. Procedure for Delivery to Owner:
 - 1. Deliver spare parts and extra materials to OWNER's permanent storage rooms at the Site or area(s) at the Site designated by OWNER.
 - 2. When spare parts and extra materials are delivered, CONTRACTOR and OWNER will mutually inventory the spare parts and extra materials delivered

to verify compliance with the Contract Documents regarding quantity, part numbers, and quality.

3. Additional procedures for delivering spare parts and extra materials to OWNER, if required, will be developed by ENGINEER and complied with by CONTRACTOR.
 4. CONTRACTOR shall reimburse OWNER for all costs and expenses incurred by OWNER, including professional services, for delivery of inadequate, incorrect, or defective spare parts and extra materials. OWNER may withhold such amounts from payments due CONTRACTOR via set-offs in accordance with the Contract Documents.
- D. Delivery Time and Eligibility for Payment:
1. Deliver to OWNER spare parts and extra materials prior to date of Substantial Completion for materials and equipment associated therewith.
 2. Do not deliver spare parts and extra materials before commencing startup for associated material or equipment.
 2. Spare parts and extra materials are not eligible for payment until delivered to OWNER and CONTRACTOR's receipt of OWNER's countersignature on letter of transmittal.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 79 23

INSTRUCTION OF OPERATIONS AND MAINTENANCE PERSONNEL

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall furnish services of Supplier's operation and maintenance training specialists to instruct OWNER's and facility manager's personnel in recommended operating and maintenance procedures for materials and equipment furnished, in accordance with the Contract Documents.
2. Supplier shall provide a combination of classroom and field training at the Site, unless otherwise required elsewhere in the Contract Documents.
3. OWNER or facility manager reserves the right to record training sessions on video for OWNER's later use in instructing OWNER's or facility manager's personnel.

B. Scheduling of Training Sessions:

1. General:

- a. CONTRACTOR shall coordinate training services with start-up and initial operation of materials and equipment on days and times, and in manner, acceptable to OWNER, in accordance with the Contract Documents.
- b. Training may be required outside of normal business hours to accommodate schedules of operations and maintenance personnel. Furnish training services at the required days and times at no additional cost to OWNER.

2. Prerequisites to Training:

- a. Training of facility operations and maintenance personnel shall commence after preliminary operation and maintenance data has been submitted and accepted by ENGINEER, and Work required in Section 01 75 11, Checkout and Startup Procedures , is complete.
- b. At option of OWNER or ENGINEER, training may be allowed to take place before, during, or after equipment startup.

3. Training Schedule Submittal:

- a. Training Schedule Required: CONTRACTOR shall prepare and submit proposed training schedule for review and acceptance by ENGINEER and OWNER. Proposed training schedule shall show and indicate all training required in the Contract Documents, and shall demonstrate compliance with specified training requirements relative to number of

- hours of training for various elements of the Work, number of training sessions, and scheduling.
- c. Timing of Training Schedule Submittal: Submit initial training schedule not less than 60 days before scheduled start of first training session. Submit final training schedule, incorporating revisions in accordance with ENGINEER's comments, not later than 30 days prior to starting the first training session.
- d. OWNER reserved the right to modify personnel availability for training in accordance with process or emergency needs at the facility.

1.2 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer's Instructors:
 - a. Shall be factory-trained by manufacturer of material or equipment.
 - b. Manufacturer's instructors shall be proficient and experienced in performing training and equipment of the type required.
 - c. Instructors shall be proficient in spoken and written English language.
 - d. Qualifications of instructors are subject to acceptance by ENGINEER. If ENGINEER does not accept qualifications of proposed instructor, furnish services of replacement instructor with acceptable qualifications.
2. Attendance is mandatory for the following:
 - a. CONTRACTOR's project manager.
 - b. CONTRACTOR's Site superintendent.
 - c. Project manager of Subcontractors responsible for furnishing materials and equipment for which training of operations and maintenance personnel is required.
 - d. Manufacturers and other Suppliers invited by CONTRACTOR.
 - f. ENGINEER.
 - g. Facility manager's staff responsible for training coordination, and staff responsible for scheduling operations and maintenance personnel.
3. If additional information must be developed to adequately cover agenda items, reconvene conference as soon as possible.
4. CONTRACTOR shall prepare minutes summarizing the discussions of conference, decisions made, and agreements and disagreements, and submit the minutes to each conference attendee.

1.3 SUBMITTALS

A. Action Submittals: Submit the following:

1. Training Schedule: Detailed schedule of training sessions, demonstrating compliance with number of training sessions, hours required in the Contract Documents, and complying with the Contract Times. Submit training schedule submittals in accordance with time frames specified in this Section.

- B. Informational Submittals: Submit the following:
 - 1. Lesson Plan: Acceptable lesson plan for training on each material or equipment item, in accordance with Table 01 79 23-A and the Contract Documents. Lesson plan shall comply with requirements of this Section as may be supplemented by Specifications Sections where materials and equipment are specified. Include with lesson plan copy of handouts that will be used during training sessions. Furnish lesson plan submittals in accordance with time frames specified in this Section.
 - 2. Qualifications:
 - a. Credentials of manufacturer's proposed operations and maintenance instructor(s). Credentials shall demonstrate compliance with requirements of this Section and shall include brief resume' and specific details of instructor's operating, maintenance, and training experience relative to the specific material and equipment for which instructor will provide training.
- C. Closeout Submittals: Submit the following:
 - 1. Trainee sign-in sheets for each training session. Submit to OWNER's training coordinator with copy to ENGINEER.

1.4 LESSON PLAN

- A. Supplier's lesson plan shall describe specific instruction topics, system components for which training will be furnished, duration of each topic, and training procedures. Handouts, if any, to be used in training shall be included with the lesson plan. Describe in lesson plan "hands-on" demonstrations planned for training sessions.
- B. Submit acceptable lesson plan not less than 14 days prior to starting associated training.
- C. Indicate in lesson plan estimated duration of each training segment.
- D. Lesson plan shall include the following:
 - 1. Material and Equipment Overview (required for all types of operations and maintenance training):
 - a. Describe material and equipment's operating (process) function and performance objectives.
 - b. Describe material and equipment's fundamental operating principles and dynamics.
 - c. Identify equipment's mechanical, electrical, and electronic components and features. Group related components into subsystems and describe function of subsystem and subsystem's interaction with other subsystems.
 - d. Identify all support materials and equipment associated with operation of subject equipment, such as air intake filters, valve actuators, motors, and other appurtenant items and equipment.
 - e. Identify and describe safety precautions and potential hazards related to operation and maintenance.

- f. Identify and describe in detail safety and control interlocks.
- 2. Operations Personnel Training:
 - a. Material and Equipment Overview: As described in Paragraph 1.4.D.1 of this Section.
 - b. Operation:
 - 1) Describe operating principles and practices.
 - 2) Describe routine operating, startup, and shutdown procedures.
 - 3) Describe abnormal or emergency startup, operating, and shutdown procedures that may apply.
 - 4) Describe alarm conditions and responses to alarms.
 - 5) Describe routine monitoring and recordkeeping procedures.
 - 6) Describe recommended housekeeping procedures.
 - c. Troubleshooting:
 - 1) Describe how to determine if corrective maintenance or an operating parameter adjustment is required.
- 3. Mechanical Maintenance Training:
 - a. Material and Equipment Overview: As described in Paragraph 1.4.D.1 of this Section.
 - b. Material and Equipment Preventive Maintenance:
 - 1) Describe preventative maintenance inspection procedures required to:
 - a) Inspect materials and equipment in operation.
 - b) Identify potential trouble symptoms and anticipate breakdowns.
 - c) Forecast maintenance requirements (predictive maintenance).
 - 2) Define recommended preventative maintenance intervals for each component.
 - 3) Describe lubricant and replacement part recommendations and limitations.
 - 4) Describe appropriate cleaning practices and recommend intervals.
 - 5) Identify and describe use of special tools required for maintenance of materials and equipment.
 - 6) Describe component removal, installation, and disassembly and assembly procedures.
 - 7) Perform “hands-on” demonstrations of preventive maintenance procedures.
 - 8) Describe recommended measuring instruments and procedures, and provide instruction on interpreting alignment measurements, as appropriate.
 - 9) Define recommended torquing, mounting, calibrating, and aligning procedures and settings, as appropriate.
 - 10) Describe recommended procedures to check and test equipment following corrective maintenance.
 - c. Equipment Troubleshooting:
 - 1) Define recommended systematic troubleshooting procedures.
 - 2) Provide component-specific troubleshooting checklists.
 - 3) Describe applicable materials and equipment testing and diagnostic procedures to facilitate troubleshooting.
 - 4) Describe common corrective maintenance procedures with “hands-on” demonstrations.
- 4. Instrumentation/Controls and Electrical Maintenance Training:

- a. Materials and Equipment Overview: As described in Paragraph 1.4.D.1 of this Section.
- b. Preventative Maintenance and Troubleshooting of Instrumentation and Control Systems: In accordance with Section 40 90 09, Plant Monitoring and Control System Training. ENGINEER may grant waiver(s) to allow all training for a given system to be at the location of OWNER's training facility.
- c. Preventative Maintenance and Troubleshooting of Other Electrical Systems: In accordance with requirements for Paragraph 1.4.D.3 of this Section.

1.5 TRAINING AIDS

- A. Manufacturer's instructor shall incorporate training aids as appropriate to assist in the instruction. Furnish handouts of text, tables, graphs, and illustrations as required. Other appropriate training aids include:
 1. Audio-visual aids, such as videos, Microsoft PowerPoint presentations, overhead transparencies, posters, drawings, diagrams, catalog sheets, or other items.
 2. Equipment cutaways and samples, such as spare parts and damaged equipment.
 3. Tools, such as repair tools, customized tools, and measuring and calibrating instruments.
- B. Handouts:
 1. Manufacturer's instructor shall distribute and use descriptive handouts during training. Customized handouts developed especially for training for the Project are encouraged.
 2. Photocopied handouts shall be good quality and completely legible.
 3. Handouts should be coordinated with the instruction, with frequent references made to the handouts.
 4. Provide not less than 10 copies of each handout for each training session.
- C. Audio-visual Equipment: Training provider shall provide audio-visual equipment required for training sessions. If suitable equipment is available at the Site, OWNER may make available OWNER's audio-visual equipment; however, do not count on OWNER providing audio-visual equipment. Audio-visual equipment that training provider shall provide, as required, includes:
 1. Laptop computer, presentation software, and suitable projector or suitable connection to TV/monitor from laptop computer using hardwired connection or bluetooth.
 2. As required, network cables, hdmi or other adaptors, extension cords and spare bulb for projector.
 3. TBD

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 TRAINING DELIVERY

A. Training Delivery – General:

1. Instructors shall be fully prepared for the training sessions. Training delivery shall be communicative, clear, and proceed according to lesson plan accepted by ENGINEER, with lesson content appropriate for trainees. If OWNER or ENGINEER deems that training delivery does not to comply with the Contract Documents, training shall be postponed, rescheduled, and re-performed in acceptable manner at no additional cost to OWNER.
2. Trainee Sign-in Sheets: In format acceptable to OWNER, furnish sign-in sheet for trainees for each session. Sign-in sheets shall include the Project name, equipment or system for which training was furnished, and type of training (e.g., operations, mechanical maintenance, instrumentation/controls maintenance, or other), and name of each trainee. Upon completion of training, submit copy of each sign-in sheet as indicated in Article 1.3 of this Section.

B. “Hands-on” Demonstrations:

1. Manufacturer’s instructor shall present “hands-on” demonstrations of operations and maintenance of materials and equipment for each training session, in accordance with lesson plan accepted by ENGINEER.
2. CONTRACTOR and manufacturer shall furnish tools necessary for demonstrations.

3.2 TRAINING SCHEDULE

A. Manufacturer shall furnish not less than the hours of training and number of sessions indicated in Table 01 79 23-A of this Section. Travel time and expenses are responsibility of manufacturer and are excluded from required training time indicated in the Contract Documents.

B. Shifts and Training Sessions Required:

1. Operations at the Site take place 24 hours per day, divided into three shifts as follows: day, evening, and night shift.
2. Training Sessions per Shift:
 - a. Operators: Maximum training per day is four hours; sessions longer than four hours shall be spread over multiple, preferably consecutive, days. Provide identical training sessions as follows:
 - 1) Two identical sessions during day shift, each session in a different week.
 - 2) One session during evening shift.
 - 3) One session during night shift.
 - b. Mechanical Maintenance: Provide two identical training sessions during day shift, each session in a separate week, for indicated

equipment. Maximum training per day is four hours; sessions longer than four hours shall be spread over multiple, preferably consecutive, days.

- c. Instrument/Controls and Electrical Maintenance: Provide two identical training sessions during day shift, each session in a separate week, for indicated equipment. Maximum training per day is four hours; sessions longer than four hours will be spread over multiple, preferably consecutive, days.

TABLE 01 79 23-A, TRAINING SUMMARY TABLE

Material or Equipment	Specification Section	Total Training Time (hours)	Training Sessions Required		
			Operations	Mechanic Maint.	Instrument/ Controls & Electrical Maint.
Alum Upgrades – Instruments	40 60 05	8	2	2	4
Alum Upgrade - Software		8	4		4
Total		16	8	8	8

++ END OF SECTION ++

SECTION 02 41 00

DEMOLITION

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified and required for demolition, removal, and disposal Work.
2. The Work under this Section includes, but is not necessarily limited to:
 - a. Demolition and removal of existing materials and equipment as shown or indicated in the Contract Documents. The Work includes demolition of structural concrete, foundations, walls, doors, windows, structural steel, metals, roofs, masonry, attachments, appurtenances, piping, electrical and mechanical systems and equipment, paving, curbs, sidewalks, gutters, fencing and similar existing facilities.
 - b. Demolition and removal of all Underground Facilities underneath, and above-grade piping and utilities in, the building(s) and structures shown or indicated for demolition, unless the Underground Facilities or above-grade facilities are shown or indicated as to remain.
 - c. Remove from slabs, foundations, walls, and footings that are to be demolished all utilities and appurtenances embedded in such construction.
3. Demolitions and removals specified under other Sections shall comply with requirements of this Section.
4. Perform demolition Work within areas shown or indicated.
5. Pay all costs associated with transporting and, as applicable, disposing of materials and equipment resulting from demolition.

B. Coordination:

1. Comply with Section 01 14 16, Coordination with Owner's Operations.
2. Review procedures under this and other Sections and coordinate the Work that will be performed with or before demolition and removals.
3. Notify other contractors in advance of demolition and removals Work to provide other contractors with sufficient time for performing work and coordinating items included in their contracts that will be performed before or in conjunction with demolition and removals Work.

C. Related Sections:

- 1.

1.2 QUALITY ASSURANCE

A. Qualifications:

1. Electrical Removals: Entity and personnel performing electrical removals shall be electrician legally qualified to perform electrical construction and electrical work in the jurisdiction where the Site is located.

2. Plumbing Removals: Entity and personnel performing plumbing removals shall be plumber legally qualified to perform plumbing construction and plumbing work in the jurisdiction where the Site is located.
- B. Regulatory Requirements:
1. Demolition, removal, and disposal Work shall be in accordance with 29 CFR 1926.850 through 29 CFR 1926.860 (Subpart T - Demolition), and all other Laws and Regulations.
 2. Comply with requirements of authorities having jurisdiction.
- 1.3 SUBMITTALS
- A. Informational Submittals: Submit the following:
1. Procedure Submittals:
 - a. Demolition and Removal Plan: Not less than ten days prior to starting demolition Work, submit acceptable plan for demolition and removal Work, including:
 - 1) Plan for coordinating shut-offs, capping, temporary services, and continuing utility services.
 - 2) Other proposed procedures as applicable.
 - 3) Equipment proposed for use in demolition operations.
 - 4) Recycling/disposal facility(ies) proposed, including facility owner, facility name, location, and processes. Include copy of appropriate permits and licenses, and compliance status.
 - 5) Planned demolition operating sequences.
 - 6) Detailed schedule of demolition Work in accordance with the accepted Process Schedule.
 2. Qualifications Statements:
 - a. Name and qualifications of entity performing electrical removals, including copy of licenses required by authorities having jurisdiction.
 - b. Name and qualifications of entity performing plumbing removals, including copy of licenses required by authorities having jurisdiction.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PREPARATION

- A. Protection of Surrounding Areas and Facilities:
1. Perform demolition and removal Work in manner that prevents damage and injury to property, structures, occupants, the public, and facilities. Do not interfere with use of, and free and safe access to and from, structures and properties.
 2. Closing or obstructing of roads, drives, sidewalks, and passageways adjacent to the Work is not allowed unless indicated otherwise in the Contract Documents. Conduct the Work with minimum interference to vehicular and pedestrian traffic.

3. Provide temporary barriers, lighting, sidewalk sheds, and other necessary protection.
 4. Repair damage to facilities that are to remain.
- B. Existing Utilities: In addition to requirements of the General Conditions, Supplementary Conditions, and Division 01 Specifications, do the following:
1. Should uncharted or incorrectly charted Underground Facilities be encountered, Contractor responsibilities shall be in accordance with the General Conditions as may be modified by the Supplementary Conditions. Cooperate with utility owners in keeping adjacent services and facilities in operation.
 2. Sanitary Sewer: Before proceeding with demolition, locate and cap all sewer lines and service laterals discharging from the building or structure being demolished.
 3. Storm Water: Existing storm water system shall remain in place until demolitions of existing building or structure is completed. Upon completing demolition, cut and cap storm sewer laterals at locations shown on the Drawings. Remove existing storm water piping and related structures between points of cutting, and backfill, restore to grade, and stabilize the area over the removed facilities.
 4. Water Piping: Before proceeding with demolition, locate and cap all potable and non-potable waterlines and service laterals serving the building or structure being demolished.
 5. Other Utilities: Before proceeding with demolition, locate and cap as required all other utilities, such as fuel and gas; heating, ventilating, and air conditioning; electric; and communications; and service laterals serving the building or structure being demolished.
 6. Shutdown of utility services shall be coordinated by Contractor, assisted by Owner as required relative to contacting utility owners.

3.2 DEMOLITION – GENERAL

- A. Locate construction equipment used for demolition Work and remove demolished materials and equipment to avoid imposing excessive loading on supporting and adjacent walls, floors, framing, facilities, and Underground Facilities.
- B. Pollution Controls:
1. Use water sprinkling, temporary enclosures, and other suitable methods to limit emissions of dust and dirt to lowest practical level. Comply with Section 01 57 05, Temporary Controls, and Laws and Regulations.
 2. Do not use water when water may create hazardous or objectionable conditions such as icing, flooding, or pollution.
 3. Clean adjacent structures, facilities, properties, and improvements of dust, dirt, and debris caused by demolition Work, in accordance with the General Conditions and Section 01 74 05, Cleaning.
- C. Comply with Section 01 73 29, Cutting and Patching.
- D. Demolition of Site Improvements:

1. Pavement, Sidewalks, Curbs, and Gutters: Demolition of asphalt or concrete pavement, sidewalks, curbs, and gutters, as applicable, shall terminate at cut edges. Edges shall be linear and have a vertical cut face.
 2. Fencing, Guardrails, and Bollards: Remove to the limits shown or indicated on the Drawings. Completely remove below-grade posts and concrete.
 3. Manholes, Vaults, Chambers, and Handholes: Remove to the limits shown or indicated on the Drawings.
- E. Finishing of Surfaces Exposed by Removals: Unless otherwise shown or indicated in the Contract Documents, surfaces of walls, floors, ceilings, and other areas exposed by removals, and that will remain as finished surfaces, shall be repaired and re-finished with materials that match existing adjacent surface, or as otherwise approved by Engineer.

3.3 DISPOSAL OF DEMOLITION DEBRIS

- A. Remove from the Site all debris, waste, rubbish, and material resulting from demolition operations and equipment used in demolition Work. Comply with the General Conditions, Supplementary Conditions, and Section 01 74 05, Cleaning. Comply with Section 01 74 19, Construction Waste Management and Disposal.
- B. Transportation and Disposal:
1. Non-hazardous Material: Properly transport and dispose of non-hazardous demolition debris at appropriate landfill or other suitable location, in accordance with Laws and Regulations. Non-hazardous material does not contain Asbestos, PCBs, Petroleum, Hazardous Waste, Radioactive Material, or other material designated as hazardous in Laws and Regulations.
 2. Hazardous Material: When handling and disposal of hazardous materials is included in the Work, properly transport and dispose of hazardous materials in accordance with the Contract Documents and Laws and Regulations.
- C. Submit to Engineer information required in this Section on proposed facility(ies) where demolition material will be recycled. Upon request, Engineer or Owner, shall be allowed to visit recycling facility(ies) to verify adequacy and compliance status. During such visits, recycling facility operator shall cooperate and assist Engineer and Owner.

+ + END OF SECTION + +

SECTION 09 91 00

PAINTING

PART 1 - GENERAL1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, tools, equipment, and incidentals as shown, specified, and required to furnish and apply paint systems.
2. Extent of painting includes the Work specified below. Painting shown in schedules may not provide CONTRACTOR with complete indication of all painting Work. Refer to Article 2.2 of this Section where all surfaces of generic types specified are specified for preparation and painting according to their status, intended function, and location, using the painting system for that surface, function, and location as specified, unless specifically identified on the Drawings as a surface not to receive specified painting system.
 - a. Existing MCC
 - c. Surface preparation and painting of all specifically identified existing items, both interior and exterior, and other surfaces, including items furnished by OWNER, are included in the Work, except as otherwise shown or specified.
 - d. Removal of all substances, top coats, primers and all intermediate coats of paint and other protective or decorative coatings on those items and surfaces to remain that are identified to receive a painting system under this Section, to provide surfaces acceptable for application of painting specified.
 - e. Approved stepped-down mock-ups for all painting systems showing all components of the surface preparation and paint system application before start of Work. Check all dry film thicknesses; demonstrate methods of surface preparation, and methods of application, and obtain ENGINEER's approval of colors and textures to be used in the Work.

B. Coordination:

1. Review installation, removal, and demolition procedures under other Sections and coordinate them with the Work specified in this Section.
2. Coordinate primers with finish paint materials to provide primers that are compatible with finish paint materials. Review other Sections where primed surfaces are provided, to ensure compatibility of total painting system for each surface. CONTRACTOR is responsible for coordinating compatibility of all shop primed and field painted items in other Sections and in general contract.
3. Furnish information to ENGINEER on characteristics of finish materials proposed for use and ensure compatibility with prime coats used. Provide barrier coats over incompatible primers or remove and repaint as required. Notify ENGINEER in writing of anticipated problems using specified painting systems with surfaces primed by others. Reprime equipment primed in factory and other factory-primed items that are damaged or scratched.

C. Related Sections:

D. Work Not Included: The following Work is not included as painting Work, or are included under other Sections:

1. Shop Priming: not used
2. Operating Parts and Labels:
 - a. Do not paint moving parts of operating units, mechanical and electrical parts such as valve and damper operators, linkages, sensing devices, interior of motors, and fan shafts.
 - b. Do not paint over labels required by governing authorities having jurisdiction at Site, or equipment identification, performance rating, nameplates, and nomenclature plates.
 - c. Cover moving parts and labels during the painting with protective masking. Remove all protective masking upon completion of Work. Remove all paint, coatings, and splatter that comes in contact with such labels.

E. Description of Colors and Finishes:

1. Color Selection:
 - a. A maximum of one different colors will be selected by ENGINEER in addition to color coding of pipelines, valves, equipment, ducts, and electrical conduit.
 - b. ENGINEER reserves the right to select non-standard colors for paint systems specified within ability of paint manufacturer to produce such non-standard colors. Provide such colors at no additional expense to OWNER.
2. Color Coding of Pipelines, Valves, Equipment, and Ducts:
 - a. In general, color-coding of electrical MCC enclosures shall comply with applicable standards of ANSI A13.1, ANSI Z535.1 and 40 CFR 1910.144. Provide color-coding for pipelines per Table 09 91 00-B, Pipeline Color Table.

<u>Color</u>	<u>Designation*</u>
Aqua	Aqua Sky; 10GN
Black	Black; 35GR
Blue	True/Safety Blue; 11SF
Brown	Terra Cotta; 07RD
Charcoal	Deep Space; 34GR
Dark Blue	True/Safety Blue; 11SF
Dark Brown	Medium Bronze; 85BR
Dark Gray	Slate Gray; 31GR
Gray	Gray-ANSI 61; 33GR
Green	Spearmint/Safety Green; 09SF
Light Blue	Fontain Bleau; 25BL
Light Brown	Twine; 68BR
Light Gray	Light Gray; 32GR
Light Green	Margarita; 38 GN
Olive	Clover; 110GN
Orange	Tangerine/Safety Orange; 04SF
Red	Candy Apple/Safety Red; 17SF
White	White; 11WH

Yellow	Lemon/Safety Yellow; 02SF
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- * Color designations are provided per Tnemec Company, Inc. paint color numbers and are provided as a standard of quality; equivalent colors matching these colors are acceptable. Provide with Shop Drawing submittal direct color comparisons of color numbers available from manufacturer submitted.
- b. General Color Code: Unless otherwise specified, use the following color code:
 - c. Color of final coats shall match as closely as possible, without custom blending, color tabulated for specific enclosure service.
4. After approval by ENGINEER of colors and Shop Drawings and prior to commencing painting Work, ENGINEER will furnish color schedules for surfaces to be painted.
- F. Abbreviations and Symbols:
- 1. Abbreviations and symbols used in painting systems are explained in Article 2.2 of this Section and provide information on generic composition of required materials, manufacturers, number of coats and dry mil film thickness per coat (DMFTPC), and coverage for determining required number of gallons for the Work.

1.2 REFERENCES

- A. Referenced Standards: Standards referenced in this Section are:
- 1. ANSI A13.1, Scheme for Identification of Piping Systems.
 - 2. ANSI Z535.1, Safety Color Code.
 - 3. ANSI/NSF Standard 60, Drinking Water Treatment Chemicals - Health Effects.
 - 4. ANSI/NSF Standard 61, Drinking Water System Components – Health Effects.
 - 5. ASTM D16, Terminology for Paint, Related Coatings, Materials and Applications.
 - 6. ASTM D2200, Pictorial Surface Preparation Standards for Painting Steel Surfaces.
 - 7. ASTM D4258, Practice for Surface Cleaning Concrete for Coating.
 - 8. ASTM D4259, Practice for Abrading Concrete.
 - 9. ASTM D4262, Testing Method for pH of Chemically Cleaned or Etched Concrete Surfaces.
 - 10. ASTM D4263, Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
 - 11. ASTM D4285, Test Method for Indicating Oil or Water in Compressed Air.
 - 12. ASTM D4417, Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel.
 - 13. ASTM D4541, Test Methods for Pull-Off Strength of Coatings Using Portable Adhesion-Testers.
 - 14. ASTM E329, Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
 - 15. AWWA C652, Disinfection of Water-Storage Facilities.
 - 16. AWWA D102, Coating Steel Water-Storage Tanks.
 - 17. California Air Resources Board (CARB) Revised Suggested Control Measure (SCM)
 - 18. 29 CFR 1910.144, Safety Color Code for Marking Physical Hazards.
 - 19. 40 CFR, Subpart D-2001, National Volatile Organic Compound Emission Standards for Architectural Coatings.

20. South Coast Air Quality Management District (SCAQMD) Rule 1113,
21. Green Seal, Inc. Paint, (GS-11).
22. Maricopa County, Arizona Architectural Coatings Rule 335.
23. National Association of Piping Fabricators, NAPF 500-03, Surface Preparation Standard For Ductile Iron Pipe and Fittings in Exposed Locations Receiving Special External Coatings And/or Special Internal Linings.
24. Ozone Transport Commission, (OTC), OTC Model Rule for Architectural and Industrial Maintenance Coatings.
25. Resource Conservation and Recovery Act of 1976 (RCRA).
26. SSPC PA 2, Measurement of Dry Coating Thickness with Magnetic Gages.
27. SSPC SP 1, Solvent Cleaning.
28. SSPC SP 3, Power Tool Cleaning.
29. SSPC SP 6, Commercial Blast Cleaning.
30. SSPC SP 10, Near-White Blast Cleaning.
31. SSPC SP 11, Power Tool Cleaning To Bare Metal.
32. SSPC VIS 1, Visual Standard for Abrasive Blast Cleaned Steel.
33. SSPC VIS 2, Method of Evaluating Degree of Rusting/Painted Steel Surfaces.
34. SSPC Volume 2, Systems and Specifications.

1.3 DEFINITIONS

- A. Standard coating terms defined in ASTM D16 apply to this Section, including:
 1. Paint: Pretreatment and all painting system materials, such as primer, emulsion, enamel, organic/inorganic polymer coating, stain sealer and filler, and other applied materials whether used as prime, filler, intermediate, or finish coats.
 2. Exposed: All items not covered with cement plaster, concrete, or fireproofing. Items covered with these materials shall be provided with specified primer only, except where specified as a surface not to be painted. Exposed-to-view surfaces include areas visible after permanent or built-in fixtures, convactor covers, ceiling tile, covers for finned tube radiation, grilles, and similar covering products are in areas scheduled to be painted.
 3. LEED Compliant: As defined by the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED), means interior field-applied coatings that shall have a maximum volatile organic compound (VOC) and chemical content as listed in Green Seal, Inc. Paints (GS-11).
 4. Low VOC: All interior and exterior field-applied coatings that have maximum VOC content as listed in OTC Model Rule for Architectural and Industrial Maintenance Coatings.
 5. OTC: Ozone Transport Commission, which recommends standard VOC content levels in several Northeastern and Mid-Atlantic states.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications:
 1. Engage a single applicator that regularly performs installation of paint materials, with documented skill and successful experience in installing types of products required and that agrees to employ only trained, skilled tradesmen who have successful experience in installing types of products specified.

2. Submit name and qualifications to ENGINEER along with following information for at least three successful, completed projects:
 - a. Names and telephone numbers of owner and design professional responsible for project.
 - b. Approximate contract cost of paint products.
 - c. Amount of area painted.
3. Submit to ENGINEER proof of acceptability of applicator by manufacturer.

C. Source Quality Control:

1. Obtain materials from manufacturers that will provide services of a qualified manufacturer's representative at Site at commencement of painting Work, to advise on products, mock-ups, installation, and finishing techniques and, at completion of Work, to advise ENGINEER on acceptability of completed Work and during the course of the Work as may be requested by ENGINEER.
2. Certify long-term compatibility of all coatings with surfaces.
3. Do not submit products that decrease number of coats, surface preparation, or generic type and formulation of coatings specified. Products exceeding VOC limits and chemical content specified will not be approved.
4. ENGINEER may review manufacturers' recommendations concerning methods of installation and number of coats of paint for each painting system. CONTRACTOR shall prepare construction costs based on painting systems, number of coats, coverage's and installation methods specified.
5. Submit "or equal" products, when proposed, with direct comparison to products specified, including information on durability, adhesion, color and gloss retention, percent solids, VOC's grams per liter, and recoatability after curing.
6. "Or equal" manufacturers shall furnish same color selection as manufacturers specified, including intense chroma and custom pigmented colors in all painting systems.
7. Color Pigments: Provide pure, non-fading, applicable types to suit surfaces and services to be painted. Comply with:
 - a. Manufacturer shall identify colors that meet the requirements of authorities having jurisdiction at Site for use in locations subject to contact with potable water or water being prepared for use as potable water.
8. Obtain each product from one manufacturer. Multiple manufacturing sources for the same system component are unacceptable.
9. Certify product shelf life history for each product source for materials manufactured by the same manufacturer, but purchased and stored at different locations or obtained from different sources.
10. Constantly store materials to be used for painting Work between 60 degrees F and 90 degrees F, and per paint manufacturer's written recommendations, for not more than six months. Certify to ENGINEER that painting materials have been manufactured within six months of installation and have not, nor will be, subjected to freezing temperatures.

D. Regulatory Requirements:

1. Comply with VOC content limits of OTC Model Rule for Architectural and Industrial Maintenance Coatings:

- a. Industrial Maintenance Coatings: 340 grams per liter.
 - b. Interior and Exterior Non-Flat Coatings: 150 grams per liter.
 2. Comply with the following:
 - a. 29 CFR 1910.144, Safety Color Code for Marking Physical Hazards.
 - b. 40 CFR, Subpart D-2001, National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - c. Resource Conservation and Recovery Act of 1976 (RCRA).
 - d. SW-846, Toxic Characteristic Leaching Procedure (TCLP).
 3. Comply with authorities having jurisdiction at Site for blast cleaning, confined space entry, and disposition of spent abrasive and debris.
- E. Mock-ups:
1. Demonstrate installation of specified painting systems on actual existing MCC at location selected by ENGINEER.
 2. Provide 4-foot by 8-foot stepped-down sample area for each painting system. Prior to application of painting system, but after ENGINEER's approval of the components of each painting system, apply a 4-foot wide sample of each operation and application step required by this Section and specified manufacturer's written application recommendations. Show each application step as a 2-foot long section that shall remain exposed to demonstrate work performed in that step. Continue application procedures until topcoat is provided. Topcoat shall be a minimum of two feet long. When completed, finished mock-up for each paint system shall reveal each step and each coat of paint required for paint system with 2-foot wide strips revealing Work performed to prepare surface and apply each coat. Lengthen overall mock-up as required to completely demonstrate each painting system. Use tinted shades differing from coat to coat for each component of each painting system.
 3. ENGINEER may approve or disapprove each component of each painting system on an individual component basis.
 4. Painting Work that does not meet standard approved on sample areas shall be removed and replaced.
 5. Painting Work advanced without approved mock-ups shall stop, and mock-ups prepared for approval by ENGINEER.
- F. Pre-painting Conference:
1. Prior to installing painting systems, arrange a meeting at Site with painting applicator and its foreman, paint manufacturer's technical representative, installers of other work in and around painting that must follow painting Work, ENGINEER, and other representatives directly concerned with performance of painting Work. Record discussions of conference and decisions and agreements and disagreements and furnish a copy of record to each party attending. Review foreseeable methods and procedures relating to painting Work including:
 - a. Review Project requirements including Contract Documents, approved Shop Drawings, pending and approved Change Orders, requests for information that submitted by CONTRACTOR to ENGINEER, and other pertinent documents.
 - b. Review required samples and submittals, both completed and to be completed.
 - c. Review status of surfaces including drying, surface preparations, and similar considerations.

- d. Review availability of materials, tradesmen, equipment, and facilities required for progress, to avoid delays, and to protect Work from damage.
- e. Review required inspection, testing, certifying, and quality control procedures.
- f. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions. Supplemental heating sources required to for working in low-temperature conditions, shall be operating and acceptable to paint applicator and ENGINEER.
- g. Review methods for complying with regulations of authorities having jurisdiction at Site, such as compliance with environmental protection, health, safety, fire, and similar regulations.
- h. Review laws and procedures covering removal and disposal of blast debris.
- 2. Reconvene meeting at earliest opportunity if additional information must be developed to conclude the required topics of the meeting.
- 3. Record revisions or changes agreed upon, reasons therefore, and parties agreeing or disagreeing with them.

1.5 SUBMITTALS

A. Action Submittals: Submit the following:

- 1. Product Data:
 - a. Copies of manufacturer's technical information and test performance data, including paint analysis, VOC and chemical component content in comparison to maximum allowed by the Contract Documents, and application instructions for each product proposed for use.
 - b. Submit proof of acceptability of proposed application techniques by paint manufacturer selected.
 - c. Copies of CONTRACTOR's proposed protection procedures in each area of the Work explaining methods of protecting adjacent surfaces from splatter, for confining application procedures in a manner that allows other work adjacent to surface preparation and painting Work to proceed safely and without interruption, and for maintaining acceptable application, curing, and environmental conditions during and after painting systems application.
 - d. List each material and cross-reference to the specific painting system and application, including a list of site-specific surfaces to which painting system will be applied. Identify by manufacturer's catalog number and general classification. State number of gallons of each product being purchased for delivery to Site and square foot area calculated to be covered by each painting system specified based on theoretical loss of 20 percent. Where actual area to be covered by paint system exceeds area submitted to ENGINEER for that system, proof of additional material purchase shall be provided to ENGINEER. Calculated coverage shall be as specified for each component of each painting system specified. This requirement does not take precedence over CONTRACTOR's responsibility to provide dry film thickness required for each component of each painting system.
 - e. Identify maximum exposure times allowable for each paint system component before next coat of paint can be applied. Submit proposed methods for preparing surfaces for subsequent coats if maximum exposure times are exceeded.

- f. Information on curing times and environmental conditions that affect curing time of each paint system component and proposed methods for accommodating variations in curing time. Identify this information for each painting system in the Work.
 - g. Specification for spray equipment with cross-reference to paint manufacturer's recommended equipment requirements.
 - 2. Samples:
 - a. Copies of manufacturer's complete color charts for each coating system.
 - b. Mock-ups specified for the Site.
- B. Informational Submittals: Submit the following:
 - 1. Certificates:
 - a. Certificate from paint manufacturer stating that materials meet or exceed Contract Documents requirements.
 - b. Evidence of shelf life history for all products verifying compliance with the requirements of the Contract Documents.
 - c. CONTRACTOR shall provide notarized statement verifying that all painting systems are compatible with surfaces specified. All painting systems components shall be reviewed by an authorized technical representative of paint manufacturer for use as a compatible system. Verify that all painting systems are acceptable for exposures specified and that paint manufacturer is in agreement that selected systems are proper, compatible, and are not in conflict with paint manufacturer's recommended specifications. Show by copy of transmittal form that a copy of letter has been transmitted to paint applicator.
 - 2. Test Reports:
 - a. Certified laboratory test reports for required performance and analysis testing in compliance with ASTM E329.
 - b. Adhesion testing plan and procedures.
 - c. Results of adhesion testing on existing surfaces containing paints or other coatings to be topcoated with paint systems specified. Prior to adhesion testing, submit a testing plan establishing methods, procedures and number of tests in each area where existing coatings are to remain and become substrate for painting Work. Based on results of adhesion testing, recommend methods, procedures, and painting system modifications, if necessary, for proceeding with Work.
 - d. Locations of and test methods for soil sampling before beginning Work and after Substantial Completion.
 - e. Proposed methods for testing, handling, and disposal of waste generated during Work.
 - f. Results of alkalinity and moisture content tests performed in accordance with ASTM D4262 and ASTM D4263.
 - g. Results of tests of film thickness, holidays, and imperfections.
 - 3. Manufacturer's Instructions: Provide paint manufacturer's storage, handling, and application instructions prior to commencing painting Work at Site.
 - 4. Manufacturer's Site Reports: Provide report of paint manufacturer's representative for each visit to Site by paint manufacturer's representative.
 - 5. Special Procedure Submittals:

- a. Proposed protection procedures for each area of Work, explaining methods of protecting adjacent surfaces from splatter, for confining application procedures in a manner that allows other work adjacent to surface preparation and painting Work to proceed safely and without interruption.
 - b. Site-specific health and safety plan.
 - c. Procedures for maintaining acceptable application, curing and environmental conditions during and after painting systems application.
 - d. Procedures for providing adequate lighting, ventilation, and personal protection equipment relative to painting Work.
 6. Qualifications:
 - a. Applicator.
 - b. Testing laboratory
- C. Closeout Submittals: Submit the following:
1. Operations and Maintenance Data: Upon completion of the painting Work, furnish ENGINEER five copies of detailed maintenance manual including the following information:
 - a. Complete and updated product catalog of paint manufacturer's currently available products including complete technical information on each product. Identify product names and numbers of each product used in the painting Work.
 - b. Name, address, e-mail address and telephone number of manufacturer, local distributor, applicator and technical representative.
 - c. Detailed procedures for routine maintenance and cleaning.
 - d. Detailed procedures for light repairs such as dents, scratches and staining.
 2. Record Documentation: Statement of Application: Upon completion of the painting Work, submit a notarized statement to ENGINEER signed by CONTRACTOR and painting applicator stating that Work complies with requirements of the Contract Documents and that application methods, equipment, and environmental conditions were proper and adequate for conditions of installation and use.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Product Delivery Requirements: Deliver products to Site in original, new, and unopened packages and containers, accurately and legibly and accurately labeled with the following:
1. Container contents, including name and generic description of product.
 2. Manufacturer's stock number and date of manufacture.
 3. Manufacturer's name.
 4. Contents by volume, for major pigment and vehicle constituents.
 5. Grams per liter of volatile organic compounds.
 6. Thinning instructions, where recommended.
 7. Application instructions.
 8. Color name and number.
- B. Product Storage Requirements:
1. Store acceptable materials at Site.

2. Store in an environmentally controlled location as recommended in paint manufacturer's written product information. Keep area clean and accessible. Prevent freezing of products.
 3. Store products that are not in actual use in tightly covered containers.
 4. Comply with health and fire regulations of authorities having jurisdiction at Site.
- C. Product Handling Requirements:
1. Handle products in a manner that minimizes the potential for contamination, or incorrect product catalyzation.
 2. Do not open containers or mix components until necessary preparatory work has been completed and approved by ENGINEER and painting Work will start immediately.
 3. Maintain containers used in storing, mixing, and applying paint in a clean condition, free of foreign materials and residue.

1.7 SITE CONDITIONS

- A. Site Facilities:
1. Supplemental heat sources, as required to maintain both ambient and surface temperatures within range recommended by paint manufacturer for paint system application, are not available at Site.
 2. Provision of supplemental heat energy sources, power, equipment, and operating, maintenance and temperature monitoring personnel is responsibility of CONTRACTOR.
 3. Do not use heat sources that emit carbon dioxide or carbon monoxide into areas being painted. Properly locate and vent such heat sources to exterior such that paint systems are unaffected by exhaust.
- B. Existing Conditions:
1. Existing surfaces to receive painting Work shall be surface-prepared to meet requirements of painting systems specified. Prior to commencing painting Work, perform adhesion tests on existing surfaces to be painted. Perform testing per ASTM D4541 or other method acceptable to ENGINEER. Number and location of tests shall be sufficient to determine condition of existing coatings and suitability of existing coatings to remain to provide acceptable substrate for new coatings. Submit testing plan prior to testing and provide ENGINEER a copy of adhesion test results.
 2. Provide abrasive blasting, scraping, or other abrading or surface film removal, or preparatory techniques accepted by ENGINEER.
 3. Before commencing painting in an area, surfaces to be painted and floors shall be cleaned of dust using commercial vacuum cleaning equipment equipped with high-efficiency particulate air (HEPA) filters and dust containment systems.
- C. Environmental Requirements:
1. Apply water-base paints when the temperature of surfaces to be painted and ambient air temperatures are between 55 degrees F and 90 degrees F, unless otherwise permitted by paint manufacturer's published instructions.
 2. Surfaces to be painted shall be at least 5 degrees F above dew point temperature and be dry to the touch. Apply paint only when temperature of surfaces to be painted,

paint products, and ambient air temperatures are between 65 degrees F and 95 degrees F, unless otherwise permitted by paint manufacturer's published instructions.

3. Apply paint system within shortest possible time consistent with manufacturer's recommended curing instructions for each coat. If chemical, salt, or other contamination contacts paint film between coats, remove contamination per SSPC SP 1 and restore surface before applying paint.
4. Do not paint tanks or pipelines containing fluid without specific permission of ENGINEER and only under conditions where "sweating" of outside surface of vessel being painted is not likely to occur within 24 hours of paint application.
5. Do not apply epoxy paints if ambient temperature is expected to go below 50 degrees F within twelve hours of application. Follow manufacturer's instructions when manufacturer's published recommendations require a higher minimum ambient temperature.
6. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent. Do not apply paint to damp or wet surfaces or when surfaces will reach dew point due to falling or rising temperatures and humidity conditions during course of paint application, unless otherwise permitted by paint manufacturer's published instructions.
7. Do not paint unacceptably hot or cold surfaces until such surfaces can be maintained within temperature and dew point ranges acceptable to paint manufacturer. Arrange for surfaces to be brought within acceptable temperature and dew point ranges as part of painting Work.
8. Moisture content of surfaces shall be verified to ENGINEER as acceptable prior to commencement of painting using methods recommended by paint manufacturer.
9. Painting may be continued during inclement weather only if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer for application and drying.
10. Provide adequate illumination and ventilation where painting operations are in progress.

D. Protection:

1. Cover or otherwise protect finished work of other trades and surfaces not being painted concurrently, or not to be painted.
2. During surface preparation and painting, facility shall remain in operation. Use procedures that prevent contamination of process or cause or require facility shutdown.
3. Coordinate and schedule surface preparation and painting to avoid exposing personnel to hazards associated with painting Work. Provide required personnel safety equipment per requirements of authorities having jurisdiction at Site.
4. Submit protection procedures to be employed. Do not begin surface preparation and painting Work until ENGINEER accepts protection techniques proposed by CONTRACTOR.
5. When working with flammable materials, provide fire extinguishers and post temporary signs warning against smoking and open flame.

1.8 MAINTENANCE

- A. Extra Materials: Furnish, tag, and store an additional one percent by volume of all coatings and colors installed. Provide a minimum of one gallon of each coating and color. Store in unopened containers as specified until turned over to OWNER.

PART 2 - PRODUCTS

2.1 PAINTING SYSTEM MANUFACTURERS

- A. Products and Manufacturers: Where referenced under painting systems provide products manufactured by the following:
 - 1. Tnemec Company, Inc. (TCI).
 - 2. The Carboline Company, part of StonCor Group, an RMP Company (TCC).
 - 3. Sherwin-Williams Company (SWC).
 - 4. Benjamin Moore & Company (BMC).
 - 5. Righter Group Inc. (RGI).
 - 6. Duron Inc. (DI).

2.2 PAINTING SYSTEMS

Ferrous Metals, Non-Ferrous Metals; Galvanized Metals							
TABLE 09 91 00-A							
Non-Submerged; Low VOC Content; Gloss; Exterior	1.5.A.2. 3.2.A. 3.2.C.1. 3.2.C.2. 3.2.E.	<u>Galvanized and Non-Ferrous Metal Primer</u> -Series V69 Epoxoline II (TCI) -Carboguard 890 (TCC)	(1) 4-6	<u>Ferrous Metal Touch Up Low Temperature</u> - Series V69F Epoxoline II (TCI) -Carboguard 890 LT (TCC) Epoxy 69%	(1) 4-6 228	-Series 1075 Endura-Shield (TCI) -Carbothane 134 VOC (TCC)	(2) 2-5
		Epoxy 67%	250	<u>Ferrous Metal Touch Up Warm Temperature</u> - Series V69F Epoxoline II (TCI) -Carboguard 890 (TCC)	(1) 4-6 228	Polyurethane 70%	220

Painting

Non-Submerged; VOC Compliant; Semi-Gloss; Exterior	1.5.A.2. 3.2.A. 3.2.C.1. 3.2.C2. 3.2.D. 3.2.E. 3.2.F.	<u>Ferrous Metal, Galvanized, and Non-Ferrous Metal Primer</u> -Series V69 Epoxoline II (TCI) -Carboguard 890 (TCC)	(1) 4-6	<u>Ferrous Metal Touch Up Low Temperature</u> - Series V69 Epoxoline II (TCI) -Carboguard 890 LT (TCC) Epoxy 69%	(1) 10 228	-Series V73 Endura-Shield (TCI) -Carbothane 133 LH (TCC)	(2) 2-4
		Epoxy 67%	234	<u>Ferrous Metal Touch Up Warm Temperature</u> - Series V69 Epoxoline II (TCI) -Carboguard 890 (TCC) Epoxy 69%	(1) 228	Polyurethane 71%	220

2.3 CALKING AND SEALANTS

- A. Refer to Section 07 92 00, Joint Sealants.

2.4 INSTRUMENTS

- A. Instruments:
 - 1. Provide one new dry-film thickness gauge for checking film thickness, one holiday detector to detect holidays or holes in the coating, and one set of visual standards to check surface preparation. Calibrate dry film thickness gauge at Site using Bureau of Standards standard shim blocks.
 - 2. Products and Manufacturers: Provide the following:
 - a. Film Thickness Testers: Model FM-III manufactured by Mikrotest, or equal.
 - b. Holiday detector shall be Model M-1 as manufactured by Tinker & Rasor, or equal.
 - c. Visual Standards: ASTM D2200, Swedish Standards, SSPC VIS 1.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine areas and conditions under which painting Work is to be performed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of Work. Do not proceed with Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.
- B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film capable of performing in accordance with claims made in paint manufacturer's product literature for surfaces and conditions encountered.
- C. Do not paint over existing paint where there is no assurance that existing paint will provide an acceptable surface for long-term adherence and durability of painting systems specified or where paint manufacturer requires removal of all existing paint to recommend use of specified painting system.

3.2 SURFACE PREPARATION

- A. General:
 - 1. Test for moisture content of surfaces before commencement of painting Work. Test for moisture in concrete in compliance with ASTM D4263. Report results to ENGINEER before commencing Work.
 - 2. Prepare existing surfaces to be painted as specified for new surfaces. Submit substitute methods of preparing existing surfaces, when proposed, with Shop Drawing submittal. ENGINEER's acceptance of substitute surface preparation methods does not relieve CONTRACTOR of

performance required under the Contract Documents. To provide surfaces acceptable for application of painting system specified:

- a. Clean and roughen surfaces of existing paint and other decorative or protective toppings on surfaces to remain that are to receive a painting system under this Section.
 - b. Where existing surfaces to be painted have corrosion, peeling paint, or unacceptably adhering coatings, remove all topcoats, primers, and intermediate coats of paint, and other protective or decorative coatings.
 - c. Protect interior of MCC from surface preparation, debris, paint, and overspray. Protect using protective barrier for each MCC bucket, allowing full preparation and painting of the exterior front and doors of MCC.
3. Perform preparation and cleaning procedures as specified herein and in strict accordance with paint manufacturer's approved instructions for each surface and atmospheric condition.
 4. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items already in place that do not require field painting, or provide effective surface-applied protection prior to surface preparation and painting.
 5. Remove as necessary items that must be field-painted where adjacent surfaces cannot be completely protected from splatter or overspray. Following completion of painting of each space or area, the removed items shall be reinstalled by workers skilled in the trades involved.
 6. Clean surfaces to be painted before applying painting system components. Remove oil and grease with clean cloths and cleaning solvents prior to mechanical cleaning.
 7. Prepare surfaces that were improperly shop-painted and abraded or rusted shop-painted surfaces as specified.

C. Ferrous Metals:

1. Ferrous Metals Except Ductile and Cast Iron:
 - a. Comply with paint manufacturer's recommendations for type and size of abrasive to provide a surface profile that meets manufacturer's painting system requirements for type, function, and location of surface. Verify that paint manufacturer-recommended profiles have been achieved on prepared surfaces. Report profiles to ENGINEER using Test Method C of ASTM D4417.
 - b. Clean non-submerged ferrous surfaces including structural steel and miscellaneous metal to be shop-primed, of all oil, grease, dirt, mill scale, and other contamination by commercial blast cleaning complying with SSPC SP 6 at time of paint system application, using SSPC VIS 1 as a standard of comparison.
 - c. Clean submerged ferrous surfaces including structural steel and miscellaneous metal to be shop-primed of all oil, grease, dirt, mill scale, and other contamination by near-white blasting complying with SSPC SP 10 at time of painting system application, using SSPC VIS 1 as a standard of comparison.

- d. Clean non-submerged, ferrous surfaces that have not been shop-coated of all oil, grease, dirt, loose mill scale, and other contamination by commercial blasting complying with SSPC SP 6 at the time of painting system application, using SSPC VIS 1 as a standard of comparison.
 - e.
 - f. Touch-up shop-applied prime coats that have damaged or have bare areas with primer recommended by paint manufacturer after commercial blasting complying with SSPC SP 6 at the time of painting system application, using SSPC VIS 1 as a standard of comparison, to provide a surface profile of not less than one mil.
 - g. Power tool-clean per SSPC SP 3 to remove welding splatter and slag.
 - h. Remove all rust and contamination on existing ferrous metals to sound surfaces by power tool-cleaning complying with SSPC SP 11 to provide a surface profile of not less than one mil.
- E. Galvanized (Zinc-Coated) Surfaces: Prepare galvanized surfaces for painting by lightly sanding with 60- to 80-mesh sandpaper or by light whip blasting.

3.3 PROTECTION OF PROPERTY AND STRUCTURES

- A. Protect property and structures adjacent to the Work from waste residues resulting from cleaning, surface preparation and paint application.
- B. Use shrouding, vacuum blasting, or other approved methods for cleaning and surface preparation of exterior surfaces.
- C. During blast cleaning and surface preparation of interior and exterior surfaces, control discharge of dust and grit, using shrouding, negative-pressure containment/dust collection systems, or other means to protect adjacent property and structures and prevent dust/grit from escaping. Similarly control removal and temporary storage of residues to protect adjacent property and structures.
- E. Submit proposed procedures for cleaning, surface preparation and paint application describing methods for protecting adjacent property and structures from residues. Do not proceed with cleaning, surface preparation or painting until proposed procedures are approved by ENGINEER.

3.4 MATERIALS PREPARATION

- A. General:
 - 1. Mix and prepare paint products in strict accordance with paint manufacturer's product literature.
 - 2. Do not mix painting materials produced by different manufacturers, unless otherwise permitted by paint manufacturer's instructions.
 - 3. Where thinners are required, they shall be produced by paint system manufacturer unless otherwise permitted by paint manufacturer's product

literature and submitted to and accepted by ENGINEER with Shop Drawings.

B. Tinting:

1. Where multiple coats of the same material are to be provided, tint each undercoat a lighter shade to facilitate identification of each coat of paint.
2. Tint undercoats to match color of finish coat of paint, but provide sufficient difference in shade of undercoats to distinguish each separate coat. Provide a code number to identify material tinted by manufacturer.

C. Mixing:

1. For products requiring constant agitation, use methods in compliance with manufacturer's product literature to prevent settling during paint application.
2. Mix in containers placed in suitably sized non-ferrous or oxide resistant metal pans to protect floors from slashes or spills that could stain the floor or react with subsequent finish floor material.
3. Mix and apply paint in containers bearing accurate product name of material being mixed or applied.
4. Stir products before application to produce a mixture of uniform density and as required during the application. Do not stir into the product film that forms on surface; instead, remove film and, if necessary, strain product before using.
5. Strain products requiring such mixing procedures. After adjusting mixer speed to break up lumps and after components are thoroughly blended, strain through 35 to 50-mesh screen before application.

3.5 APPLICATION

A. General:

1. Apply paint systems by brush, roller, or airless spray per manufacturer's recommendations and in compliance with Paint Application Specifications No. 1 in SSPC Volume 2, where applicable. Use brushes best suited for type of paint applied. Use rollers of carpet, velvet back, or high pile sheeps wool as recommended by paint manufacturer for product and texture required. Use air spray and airless spray equipment recommended by paint manufacturer for specific painting systems specified. Submit a list of application methods proposed, listing paint systems and location.
2. Paint dry film thicknesses required are the same regardless of the application method. Do not apply succeeding coats until previous coat has completely dried.
3. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint, until paint film is uniform finish, color, and appearance, particularly for intense chroma primary colors. Ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a film thickness equivalent to that of flat surfaces.
4. Surfaces of items not normally exposed-to-view do not require the same color as other components of system of which they are part, but require the same painting system specified for exposed surfaces of system.

5. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint before final installation of registers or grilles.
6. Paint backs of access panels and removable or hinged covers to match exposed surfaces.
7. Paint aluminum parts in contact with dissimilar materials with specified paint system.
8. Paint tops, bottoms, and side edges of doors the same as exterior surfaces.
9. Omit field-applied primer on metal surfaces that have been primed in the shop. Touch-up paint shop-primed coats and pre-finished items only when approved by ENGINEER using compatible primers and manufacturer's recommended compatible field-applied finishes.
10. Welds shall be stripe-coated with intermediate or finish coat of paint after application of prime coat.

B. Minimum/Maximum Paint Film Thickness:

1. Apply each product at not less than, nor more than, manufacturer's recommended spreading rate, and provide total dry film thickness as specified.
2. Apply additional coats of paint if required to obtain specified total dry film thickness.
3. Maximum dry film thickness shall not exceed 100 percent of minimum dry film thickness, except where more stringent limitations are recommended by paint manufacturer for a specific product.

C. Scheduling Surface Preparation and Painting:

1. As soon as practical after preparation, apply first-coat material to surfaces that have been cleaned, pretreated, or otherwise prepared for painting. Apply first-coat material before subsequent surface deterioration due to atmospheric conditions existing at time of surface preparation and painting. Surfaces that have started to rust before first-coat application is complete shall be brought back to required standard by abrasive blasting.
2. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure and application of another coat of paint does not cause lifting or loss of adhesion to undercoat.
3. Scarify primers and other painting system components by brush-blasting if paint has been exposed for lengths of time or under conditions beyond manufacturer's written recommendations for painting systems required, intended use, or method of application proposed for subsequent coats of paint.
4. Schedule cleaning and painting so that dust and other contaminants from cleaning process do not fall on wet, newly painted surfaces.

D. Prime Coats: Recoat primed and sealed walls and ceilings where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects caused by insufficient sealing.

- E. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage.
- F. Brush Application:
 - 1. Brush out and work all brush coats onto surfaces in an even film. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections are unacceptable. Neatly draw all glass and color break lines.
 - 2. Brush-apply primer or first coats, unless otherwise permitted to use mechanical applicators.
- G. Mechanical Applicators:
 - 1. Use mechanical methods for paint application when permitted by governing ordinances, manufacturer, and approved by ENGINEER.
 - 2. Limit roller applications, if approved by ENGINEER, to interior wall finishes for second and third coats. Apply each roller coat to provide the equivalent hiding as brush-applied coats.
 - 3. Where spray application is used, apply each coat to provide equivalent hiding of brush-applied coats. Do not double back with spray equipment for purpose of building up film thickness of multiple coats in one pass.
- H. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint Work not in compliance with specified requirements as required by ENGINEER.

3.6 FIELD QUALITY CONTROL

- A. ENGINEER may invoke the following material testing procedure at any time for a maximum of five times during field painting Work:
 - 1. CONTRACTOR shall engage service of an independent testing laboratory to sample paints used, as designated by ENGINEER. Samples of products delivered to Site shall be obtained, identified, sealed, and certified as to being products actually applied to surfaces in each area, in presence of CONTRACTOR.
 - 2. A testing laboratory selected by OWNER and paid for by CONTRACTOR shall perform appropriate tests for any or all of the following:
 - a. Abrasion resistance.
 - b. Apparent reflectivity.
 - c. Flexibility.
 - d. Washability.
 - e. Absorption.
 - f. Accelerated weathering.
 - g. Dry opacity.
 - h. Accelerated yellowness.
 - i. Recoating.
 - j. Skinning.
 - k. Color retention.
 - l. Alkali resistance.
 - m. Quantitative materials analysis.

3. If test results show that products being used do not comply with specified requirements, CONTRACTOR may be directed to stop painting Work and remove non-complying paint, and shall prepare and repaint surfaces coated with rejected paint with material complying with the Contract Documents.
- B. Notify ENGINEER after completing each coat of paint. After inspection and checking of film thickness, holidays, and imperfections, and after acceptance by ENGINEER, proceed with succeeding coat. Perform testing using testing instruments specified in Article 2.4 of this Section.
 1. ENGINEER will witness all testing and shall be notified of scheduled testing at least twenty-four hours in advance.
 2. Apply additional coats, if required, to produce specified film thickness and to correct holidays and to completely fill all surface air holes.
- C. For magnetic substrates, measure thickness of dry film nonmagnetic coatings following recommendations of SSPC PA-2. These procedures supplement manufacturers' approved instructions for manual operation of measurement gauges and do not replace such instructions.
- D. Record time, location, number of coats, dry film thickness, holidays, and other imperfections and submit testing results to ENGINEER.

3.7 PROTECTION OF NEW FINISHES

- A. Provide signs that read, "Wet Paint" as required to protect newly painted finishes. Remove temporary wrappings provided for protection of the Work after completion of painting.

3.8 ADJUSTING AND CLEANING

- A. Correct damages to work of other trades through cleaning, repairing or replacing, and repainting, as acceptable to ENGINEER.
- B. During progress of Work, remove from Site all discarded paint materials, rubbish, cans, and rags at end of each workday.
- C. Upon completion of painting, clean paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, while avoiding scratching or otherwise damaging finished surfaces.
- D. At completion of work of other trades, touch-up and restore damaged or defaced painted surfaces as determined by ENGINEER.

3.9 SCHEDULES

- A. The schedule listed below, following the "End of Section" designation, are a part of this Specification section.
 1. Table 09 91 00-C, Painting Schedule.

**TABLE 09 91 00-C
PAINTING SCHEDULE**

Facility or Surface *	Room No.	Painting System **	Remarks
Existing MCC	Crosstown WTP Chemical Building	A	

* Refer to Drawings for facility locations and for facilities not listed above.

** Refer to Article 2.2 of this Section.

+ + END OF SECTION + +

SECTION 26 05 05

GENERAL PROVISIONS FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals shown, specified, and required to complete the electrical Work.

B. Coordination:

1. Review installation procedures and schedules under other Specification Sections and coordinate with other trades the installation of electrical items that will be installed with or within formwork, walls, partitions, ceilings, and panels.
2. Coordination and Intent of Electrical Drawings:
 - a. Dimensions on Drawings related to equipment are based on equipment of certain manufacturers. Verify the dimensions of equipment furnished to space available at the Site and allocated to the equipment.
 - b. Drawings show the principal elements of the electrical Work and are not intended as detailed working drawings for the electrical Work. Drawings supplement and complement the Specifications and other Contract Documents relative to principal features of electrical systems.
 - c. Equipment and devices provided under this Contract shall be properly connected and interconnected with other equipment and devices for successful operation of complete systems, whether or not all connections and interconnections are specifically mentioned or shown in the Contract Documents.
 - d. Drawings are provided for CONTRACTOR's guidance in fulfilling the intent of the Contract Documents. CONTRACTOR shall comply with Laws and Regulations, including safety and electrical codes, and provide materials, equipment, appurtenances, and specialty items necessary for complete and operable systems.

C. Related Sections:

1. Section 02 41 00, Demolition.
2. Section 03 00 05, Concrete.
3. Section 05 05 33, Anchor Systems.

4. Section 31 20 00, Earth Moving.
5. Section 31 23 16.13, Trenching.
6. Section 40 60 05, Instrumentation and Control for Process Systems.

1.2 QUALITY ASSURANCE

A. Qualifications:

1. Electrical Subcontractor:

- a. Electrical Subcontractor shall have not less than five years experience installing electrical systems of the types required for the Project.
- b. Electrical Subcontractor shall possess a valid electricians' and contractors' license in the jurisdiction where the Site is located.
- c. Submit the following information for not less than three successful, completed projects: project name and location; year completed; name and contact information for: prime contractor for whom electrical Subcontractor worked, project owner, and project engineer or architect, including addresses and telephone numbers.

B. Component Supply and Compatibility:

1. Materials and equipment similar to each other shall be from the same manufacturer for uniformity.

C. Regulatory Requirements:

1. Permits: Refer to the General Conditions, Supplementary Conditions, and other parts of the Contract Documents for responsibilities relative to obtaining and paying for permits, licenses, and inspection fees.
2. Codes: Refer to Section 01 42 00, References, for indication of applicable codes.

1.3 SUBMITTALS

A. General:

1. To the extent practical, submit Shop Drawings and other CONTRACTOR submittals for each Specification Section into the smallest number of submittals possible. Do not furnish partial submittals.
2. Review of equipment submittals does not relieve CONTRACTOR of responsibility for providing complete and successfully operating systems.

B. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Internal wiring diagram and drawings indicating all connections to components and numbered terminals for external connections.
 - b. Dimensioned plan, section, elevations, and panel layouts showing means for modifications and for mounting, conduit connection, and grounding.
 - c. List of components including manufacturer's name and catalog number (or part number) for each.
 2. Product Data:
 - a. Manufacturer's name and product designation or catalog number.
 - b. Electrical ratings.
 - c. Manufacturer's technical data and specifications.
 - d. Manufacturer's indication of compliance with applicable reference standards.
 - e. Painting and coating systems proposed.
 3. Test Procedures: Proposed testing procedures and testing limitations for source quality control testing and field quality control testing.
- C. Informational Submittals: Submit the following:
1. Manufacturer's Instructions:
 - a. Installation data and instructions.
 - b. Instructions for handling, starting up, and troubleshooting.
 2. Source Quality Control Submittals: Results for required shop testing.
 3. Field Quality Control Submittals: Results for required field testing.
 4. Qualifications:
 - a. Electrical Subcontractor.
- D. Closeout Submittals: Submit the following:
1. Record Documentation:
 - a. System Record Drawings: Include the following:
 - 1) One-line wiring diagram of the electrical distribution system.
 - 2) Actual, in-place conduit and cable layouts with schedule of conduit sizes and number, and size of conductors.
 - 3) Layouts of the power and lighting arrangements and the grounding system.

- 4) Control schematic diagrams, with terminal numbers and control devices identified, for all equipment.
- b. Record documents shall indicate final equipment and field installation information.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Contractor shall comply with requirements specific to all electrical systems work mentioned in Section 01 65 00, Product Delivery Requirements, and Section 01 66 00, Product Storage and Handling Requirements.

PART 2 – PRODUCTS

- A. Performance Criteria:
 1. Electrical equipment shall be capable of operating successfully at full-rated load, without failure, with ambient outside air temperature of 30 degrees F to 100 degrees F and an elevation of 1100 feet above mean sea level.
 2. Unless specified otherwise, electrical equipment shall have ratings based on 75 degrees C terminations.
- B. Testing Laboratory Labels: Electrical materials and equipment shall bear the label of Underwriters' Laboratories, Inc., or other nationally recognized, independent testing laboratory, where standards have been established and label service applies.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine conditions under which Work will be performed and notify ENGINEER in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. General:
 1. Install materials and equipment in accordance with the Contract Documents, Laws, and Regulations, approved (and accepted, as applicable) Shop Drawings and other CONTRACTOR submittals, and manufacturer's recommendations.
 2. Provide tools and equipment required to trace circuits necessary for proper execution of the Work.
 3. Define and identify all wiring, circuit terminations, and equipment to be modified to ensure proper interface of components. The Contract Price includes all costs associated with field services specified for a complete and functional system.

3.3 FIELD QUALITY CONTROL

A. Field Quality Control – General:

1. Perform field quality control for electrical Work in accordance with the Contract Documents.

B. Site Tests:

1. Prior to requesting certificate of Substantial Completion, demonstrate to ENGINEER those electrical systems and electrically operated equipment installed or modified under the Contract operates in accordance with the Contract Documents and operates as required both manually and through the SCADA system.
2. Perform the following operational tests on electrical systems:
 - a. Operate power circuits to verify proper operation and connection to electrical systems materials and equipment, including mechanical key-interlocks for circuit breakers.
 - b. Operate control circuits, including pushbuttons, indicating lights, and similar devices, to verify proper connection and function. Operate all devices, such as pressure switches, flow switches, and similar devices, to verify that shutdowns and control sequences operate as required.
 - c. Operate lighting systems and receptacle devices to verify proper operation and connections.
 - d. Provide wiring checks on all installed or modified wiring prior to placing equipment in operation or equipment startup testing
3. Prepare and submit report on the equipment demonstration and operating field quality control tests. Report shall include complete information on the tests performed, date completed, and results.

C. Manufacturer's Services:

1. Furnish at the Site qualified, factory-trained representative(s) of equipment manufacturers for the services indicated in the Contract Documents.

++ END OF SECTION ++

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals shown, specified, and required to furnish and install low-voltage conductors and cabling.
2. Types of cabling required include:
 - a. Insulated cable for installation in raceways.

B. Related Sections:

1. Section 26 05 53, Identification for Electrical Systems.
2. Section 31 20 00, Earth Moving.
3. Section 31 23 16.13, Trenching.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ANSI/NETA ATS, Acceptance Testing Specifications for Electrical Power Equipment and Systems.
2. ASTM B3, Specification for Soft or Annealed Copper Wire.
3. ASTM B8, Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard or Soft.
4. UL 44, Thermoset-Insulated Wires and Cables.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with the following:

1. NEC Article 300, Wiring Methods.
2. NEC Article 310, Conductors for General Wiring.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Product Data:
 - a. Manufacturer's literature, specifications, and engineering data for low volt insulated cable proposed for use.

- B. Informational Submittals: Submit the following:
 - 1. Field Quality Control Submittals:
 - a. Written results of field insulation resistance tests.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Insulated Cable in Raceways:
 - 1. Application: Use for circuits located indoors and outdoors.
 - 2. Manufacturers: Provide products of one of the following:
 - a. Southwire.
 - b. The Okonite Company.
 - c. American Insulated Wire
 - d. General Cable
 - e. Or approved equal.
 - 3. Material: Single conductor copper cable complying with ASTM B3 and ASTM B8 with flame-retardant, moisture- and heat-resistant insulation rated for 90 degrees C in dry or wet locations, listed by UL as Type XHHW-2 or RHW-2 complying with UL 44.
 - 4. Wire Sizes: Not smaller than No. 12 AWG for power and lighting and No. 14 AWG for 120-volt control circuits.
 - 5. Stranding: 600-volt cable shall be stranded, except that solid cable, No. 10 and smaller may be used for lighting circuits.
- B. Cable Connectors, Solderless Type:
 - 1. Products and Manufacturers: Provide products of one of the following:
 - a. T&B Sta-Kon.
 - b. Burndy Hylug.
 - c. Or approved equal.
 - 2. For wire sizes No. 4 AWG and above, use either compression type or bolted type with silver-plated contact faces.
 - 3. For wire sizes up to and including No. 6 AWG, use compression type. Alarm and control wire shall be terminated using forked type connectors at terminal boards.
 - 4. For wire sizes No. 250 KCMIL and larger, use connectors with at least two cable clamping elements or compression indents and provision for at least two bolts for joining to apparatus terminal.

Low-Voltage Electrical Power Conductors and Cables

5. Properly size connectors to fit fastening device and wire size. Connectors shall be rated for 90 degree C, 600 volts.

C. Cable Splices:

1. Products and Manufacturers:
 - a. Compression-Type Splices: Provide one of the following:
 - 1) Burndy Hylink.
 - 2) T&B Color-Keyed Compression Connectors.
 - 3) Or approved equal.
 - b. Spring Connectors: Provide one of the following:
 - 1) Buchanan B-Cap.
 - 2) T&B Wire Connector.
 - 3) Or approved equal.
2. For wire sizes No. 8 AWG and larger, splices shall be made up with compression type copper splice fittings. Splices shall be taped and covered with materials recommended by cable manufacturer to provide insulation equal to that on conductors.
3. For wire sizes No. 10 AWG and smaller, splices may be made up with pre-insulated spring connectors.
4. For wet locations, splices shall be waterproof. Compression type splices shall be waterproofed by sealant-filled, thick wall, heat shrinkable, thermosetting tubing or by pouring thermosetting resin into mold that surrounds the joined conductor. Spring connector splices shall be waterproofed with sealant filler.
5. Splices shall be suitably sized for cable, rated 90 degrees C, and 600 volts.

D. Wire and Cable Markers:

1. Provide wire and cable markers in accordance with Section 26 05 53, Identification for Electrical Systems.

2.2 SOURCE QUALITY CONTROL

A. Factory Tests:

1. Factory-test wire and cable in accordance with UL standards. Provide test results.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install cables complete with proper terminations at both ends. Check and correct for proper phase sequence and proper motor rotation.

Low-Voltage Electrical Power Conductors and Cables

- B. Pulling:
1. Use insulating types of pulling compounds containing no mineral oil.
 2. Pulling tension shall be within limits recommended by wire and cable manufacturer.
 3. Use dynamometer where mechanical means are used.
 4. Cut off section subject to mechanical means.
- C. Bending Radius: Limit to minimum of six times cable overall diameter.
- D. Slack: Provide maximum slack at all terminal points.
- E. Splices:
1. Where possible, install cable continuous, without splice, from termination to termination.
 2. Where required, splice as shown and where required for cable installation. Splices below grade, in manholes, handholes, and wet locations shall be waterproof.
 3. Splices are not allowed in conduits.
- F. Identification:
1. Identify conductors in accordance with Section 26 05 53, Identification for Electrical Systems.
 2. Identify power conductors by circuit number and phase at each terminal or splice location.
 3. Identify control and status wiring using numeral tagging system.
- G. Color-code power cables as follows:
1. No. 8 AWG and Smaller: Provide colored conductors.
 2. No. 6 AWG and Larger: Apply general-purpose, flame-retardant tape at each end, wrapped in overlapping turns to cover an area of at least two inches.
 3. Colors: Match color scheme in use at the Site. If the Site does not have an existing color scheme, use the following colors:

System	Conductor	Color
All Systems	Equipment Grounding	Green
240/120 Volts Single-Phase, Three-Wire	Grounded Neutral One Hot Leg Other Hot Leg	White Black Red
208Y/120 Volts Three-Phase, Four-Wire	Grounded Neutral Phase A Phase B Phase C	White Black Red Blue
240/120 Volts	Grounded Neutral	White

Low-Voltage Electrical Power Conductors and Cables

System	Conductor	Color
Three-Phase, Four-Wire Delta, Center Tap Ground on Single-Phase	Phase A High (wild) Leg Phase C	Black Orange Blue
480Y/277 Volts Three-Phase, Four-Wire	rounded Neutral Phase A Phase B Phase C	Gray Brown Orange Yellow

3.2 FIELD QUALITY CONTROL

A. Site Tests:

1. Test each electrical circuit after permanent cables are in place, to demonstrate that circuit and equipment are connected properly and will perform satisfactorily, free from improper grounds and short circuits.
2. Individually test 600-volt cable mechanical connections after installation and before they are put in service, with calibrated torque wrench. Values shall be in accordance with manufacturer's recommendations.
3. Individually test 600-volt cables for insulation resistance between phases and from each phase to ground. Test after cables are installed and before they are put in service, with Megger for one minute at voltage rating recommended by cable manufacturer or in accordance with ANSI/NETA ATS recommendations.
4. Insulation resistance for each conductor shall not be less than value recommended by cable manufacturer. Cables not meeting recommended value or that fail when tested under full load conditions shall be replaced with a new cable for full length.

++ END OF SECTION ++

SECTION 26 05 23

INSTRUMENTATION AND COMMUNICATION CABLES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals shown, specified, and required to furnish and install instrumentation and communication cables.
2. Types of cables include the following:
 - a. Shielded instrumentation cables.
 - b. Data communication cables.

B. Related Sections:

1. Section 26 05 33.13, Rigid Conduits.
2. Section 26 05 53, Identification for Electrical Systems.

1.2 TERMINOLOGY

A. The following words or terms are not defined but, when used in this Section, have the following meaning:

1. “CPE” means chlorinated polyethylene.
2. “FEP” means fluorinated ethylene-propylene.
3. “XLPE” means cross-linked polyethylene.

1.3 REFERENCES

A. Standards referenced in this Section are:

1. ASTM A510, Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel.
2. ASTM B633, Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
3. ANSI/TIA/EIA-568, Commercial Building Telecommunications Cabling (requirements and restrictions of Technical Service Bulletins (TSBs) apply.)
4. UL 13, Power-Limited Circuit Cables.
5. UL 1581, Electrical Wires, Cables, and Flexible Cords.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:

Instrumentation and Communication Cables

1. NEC 725, Class 1, Class 2, and Class 3 Remote-Control, Signaling and Power-Limited Circuits.
2. NEC 727, Instrumentation Tray Cable.
3. NEC 800, Communications Circuits.

1.5 SUBMITTALS

- A. Action Submittals: Submit the following:
 1. Product Data: Manufacturer's technical information for instrumentation cables and communications cables proposed.
- B. Informational Submittals: Submit the following:
 1. Field Quality Control Submittals: Written report of results of field quality control testing specified in this Section.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. General:
 1. Cables shall bear the UL label.
- B. Single Shielded Pair Instrument Cables:
 1. Manufacturers: Provide products of one of the following:
 - a. Belden Company.
 - b. Okonite Company.
 - c. Dekoron Wire and Cable Company.
 - d. Or approved equal.
 2. Tinned Copper, XLPE-insulated, stranded conductors, not less than no. 16 AWG, twisted pair, with overall shield, stranded tinned no. 18 AWG copper drain wire and overall PVC or CPE jacket. Rated for not less than 600 volts and complying with UL 1581 or UL 13.
- C. Multi-Paired Shielded Instrument Cables:
 1. Manufacturers: Provide products of one of the following:
 - a. Belden Company.
 - b. Okonite Company.
 - c. Dekoron Wire and Cable Company.
 - d. Or approved equal.
 2. Tinned Copper, XLPE- insulated stranded conductors, not less than no 16 AWG, stranded tinned no. 18 AWG copper drain wire, with

overall 100% foil shield and overall PVC or CPE outer jacket. Rated for not less than 600 volts.

D. Multi-Conductor Shielded Instrument Cables:

1. Manufacturers: Provide products of one of the following:
 - a. Belden Company.
 - b. Okonite Company.
 - c. Dekoron Wire and Cable Company.
 - d. Or approved equal.
2. Tinned copper, XLPE-insulated stranded conductors, not less than no. 16 AWG, stranded tinned no. 18 AWG copper drain wire, with overall 100 percent foil shield and overall PVC or CPE jacket. Rated for not less than 600 volts.

E. Cable Terminals:

1. Manufacturers: Provide products of one of the following:
 - a. T&B Sta-Kon.
 - b. Burndy Insulug.
 - c. Or approved equal.
2. Fork type copper compression terminals with nylon insulation for termination of cable at terminal blocks.

F. Horizontal Unshielded Twisted Pair (UTP) Cables:

1. Horizontal cabling is cabling between and including the telecommunications outlet/connector and patch panel or termination block.
2. Manufacturers: Provide products of one of the following:
 - a. Bertek.
 - b. Belden.
 - c. Mohawk
 - d. Or approved equal.
3. Cables shall consist of no. 24 AWG, thermoplastic-insulated, solid conductors formed into four individually twisted pairs and enclosed by thermoplastic jacket.
4. Comply with ANSI/TIA/EIA-568, Part 10.2.
5. Riser-rated where installed in conduit. Other installations shall be plenum-rated.
6. Rated for Category 6 use.

G. Patch Cords:

1. Patch cords are used for connecting patch panel to hub, or wall jack to equipment.
2. Manufacturer: Provide products of one of the following:
 - a. Bertek.
 - b. Belden.
 - c. Mohawk
 - d. Or equal.
3. Cables shall consist of no. 24 AWG, thermoplastic-insulated, stranded conductors formed into four individually-twisted pairs and enclosed by thermoplastic jacket.
4. Cables shall be riser-rated.
5. Rated for Category 6 use.
6. Cables shall incorporate integral strain relief into the connector at each end. Connectors shall be RJ45 plugs.
7. Provide the following patch cords:
 - a. One 10-foot cable per wall jack installed.
 - b. One 3-foot cable per every two wall jacks installed.
 - c. One 5 foot cable per every two wall jacks installed.

H. Connecting Hardware for Unshielded Twisted Pair (UTP) Cables:

1. Hardware used to terminate UTP cable shall comply with ANSI/TIA/EIA-568, Part 10.4.
2. Connecting hardware shall be compatible with wiring specified in the Contract Documents.
3. Rated for Category 6 use.
4. Connecting hardware shall utilize 110-type terminal blocks to coordinate with patch panels and termination blocks specified in the Contract Documents.
5. Telecommunications Outlets/Connectors:
 - a. Manufacturers: Provide products of one of the following:
 - 1) Hubbell.
 - 2) Or approved equal.
 - b. Outlets and connectors shall utilize RJ45 (eight-pin modular) plug/receptacle configuration.
 - c. Outlets and connectors shall utilize T568B pin/pair assignments and must be coordinated with wire type (solid or stranded conductor).
 - d. Outlets shall be flush-mount type or surface-mount type, as indicated on the Drawings, or as appropriate for existing facility.

I. Patch Panels:

1. Manufacturers: Provide products of one of the following:
 - a. Black Box.
 - b. Or approved equal.
2. Patch panels shall utilize RJ45 (eight-pin modular) plug/receptacle configuration and utilize T568B pin/pair assignments for receptacles.
3. Coordinate patch panel terminations with wire type (solid or stranded conductor).
4. Patch panels shall be wall-mount type or rack-mount type, as indicated on the Drawings.
5. Listed as Category 6.
6. Provide quantity of ports not less than the quantity of wall jacks installed in the building/area served, plus 50 percent additional as spares.

J. Cable Support Hardware:

1. Conduit:
 - a. Where conduit is shown or indicated on the Drawings, comply with Section 26 05 33.13, Rigid Conduits.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine conditions under which materials and equipment will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. General:
 1. Install cables complete with proper terminations at both ends.
 2. Install in conduit separate from power cables, unless shown or indicated otherwise.
 3. Ground shield on shielded cables at one end only and as recommended by instrument manufacturer.
 4. Identify conductors in accordance with Section 26 05 53, Identification for Electrical Systems.
 5. Install and terminate Supplier-furnished cable in accordance with equipment manufacturer requirements and cable manufacturer's recommendations.

6. Install in accordance with manufacturer requirements, Laws and Regulations, including NEC.

3.3 FIELD QUALITY CONTROL

A. Site Tests:

1. Test the shielded instrumentation cable shields with ohmmeter for continuity along full length of cables, and for shield continuity to ground.
2. Connect shielded instrumentation cables to calibrated 4 to 20 mA dc signal transmitter and receiver. Test at 4 and 20 mA transmitter settings.
3. Replace with new cables the full length of cables that fail test.
4. Test equipment shall be provided by the CONTRACTOR.
5. For testing of communications cables, test equipment used shall comply with the following:
 - a. Equipment shall consist of a “master” and a “remote” unit.
 - b. Test of all aspects of cables shall be automatic and initiated with a single command. Test over entire frequency range. Test unit shall be capable of accepting cable identification tag for reporting. Test unit shall return “pass/fail” status for cables and, if “fail,” shall indicate reason for failure.
 - c. Test unit shall be capable of storing all test results internally and printing the results later.
 - d. For unshielded twisted pair cables, test unit shall be specifically designed and manufactured to certify cabling relative to Category 6 compliant.

++ END OF SECTION ++

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install complete grounding for electrical systems, structures, and equipment.

A. Related Sections:

1. 32 31 00, Fences
2. 26 05 05, General Provisions for Electrical Systems

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ASTM B8, Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard or Soft.
2. UL 467, Grounding and Bonding Equipment.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements

1. National Electrical Code, (NEC).
 - a. NEC Article 250, Grounding and Bonding.
2. NFPA 70E, Electrical Safety in the Workplace

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Listing of grounding connector types identifying where each will be used.
 - b. Layouts of each structure's ground grid.
 - c. Test point construction details.
2. Product Data:
 - a. Manufacturer's technical information for grounding materials proposed for use.
3. Testing Plans:

Grounding and Bonding for Electrical Systems

- a. Ground resistance test procedure.
- B. Informational Submittals: Submit the following:
 - 1. Field Quality Control Submittals
 - a. Results of ground resistance tests at each test point.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Bare Ground Cable:
 - 1. Manufacturers: Provide products of one of the following:
 - a. Cablec Corporation.
 - b. General Cable Corporation.
 - c. Southwire Cable Company.
 - d. Or approved equal.
 - 2. Material: Soft-drawn, bare copper stranded cable complying with ASTM B8. No. 4/0 AWG minimum size unless otherwise shown or indicated on the Drawings.
- B. Ground Rods:
 - 1. Manufacturers: Provide products of one of the following:
 - a. Copperweld, Bimetallics Division.
 - b. ITT Blackburn Company.
 - c. Or approved equal.
 - 2. Material: Copper-clad rigid steel rods, 3/4-inch diameter, ten feet long.
 - 3. All required ancillary items: As shown in Contract Drawings.
- C. Grounding Connectors:
 - 1. Products and Manufacturers: Provide one of the following:
 - a. Pressure Connectors:
 - 1) O.Z./Gedney, Division of General Signal Corporation.
 - 2) Burndy Corporation.
 - 3) Or approved equal.
 - b. Welded Connections:
 - 1) Cadweld by Erico Products, Incorporated.
 - 2) Therm-O-Weld by Burndy Corporation.
 - 3) Or approved equal.

Grounding and Bonding for Electrical Systems

2. Material: Pressure connectors shall be copper alloy castings, designed and fabricated specifically for items to be connected and assembled with Durium or silicone bronze bolts, nuts, and washers. Welded connections shall be by exothermic process utilizing molds, cartridges, and hardware designed specifically for connection to be made.
- D. Ground Test Well:
 1. As shown in Contract Drawings.
- E. Ground Bonding Jumpers:
 1. Braided copper tape, one inch wide, woven of No.30 gauge bare copper wire, terminated with copper ferrules.
- F. Ground system components shall comply with UL 467.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine conditions for the Work and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 STRUCTURE GROUND SYSTEM

- A. Provide ground grids as shown and indicated on the Drawings.
- B. Provide No. 4/0 bare copper cable around exterior perimeter of structures at not less than 2.5 feet below grade, unless otherwise shown or indicated on the Contract Documents.
- C. For structures with steel columns, provide No. 4/0 ground cable from grid to each column around perimeter of structure. Connect cable to steel with exothermic welds.
- D. Connect grids to continuous underground water pipe system, when practical.
- E. For new structures with concrete foundation or footings, connect structure's reinforcing steel or other concrete-encased electrode to grounding grid.
- F. Provide accessible test points for measuring the ground resistance of each grid.
- G. Weld all buried connections except for test points.

3.3 EQUIPMENT GROUNDING

- A. Ground electrical equipment in compliance with Laws and Regulations and the Contract Documents.
- B. Equipment grounding conductors shall be bare stranded copper cable of adequate size installed in metal conduit where required for mechanical

Grounding and Bonding for Electrical Systems

protection. Ground conductors, pulled into conduits with non-grounded conductors, shall be insulated. Insulation shall be green.

- C. Control panels grounding conductors shall be bare stranded copper cable of adequate size to ground grid from AC ground bus, and an insulated stranded copper cable of adequate size to ground grid from DC ground bus.
- D. Connect ground conductors to conduit with copper clamps, straps, or with grounding bushings.
- E. Connect to piping by welding or brazing. Use copper bonding jumpers on gasketed joints.
- F. Connect to equipment by means of lug compressed on cable end. Bolt lug to equipment frame using holes or terminals provided on equipment specifically for grounding. Do not use hold-down bolts. Where grounding provisions are not included, drill suitable holes in locations recommended by equipment manufacturer or designated by ENGINEER.
- G. Connect to motors by bolting directly to motor frames, not to soleplates or supporting structures.
- H. Connect to service water piping by means of copper clamps. Use copper bonding jumpers on gasketed joints.
- I. Scrape bolted surfaces clean and coat with conductive oxide-resistant compound.

3.4 FIELD QUALITY CONTROL

- A. Site Tests:
 - 1. Test completed grounding systems for resistance to ground using an electrical three-terminal ground resistance tester. Test all grounded cables and metal parts for continuity of connection. ENGINEER and OWNER will witness the testing.
 - 2. Grounding system maximum resistance shall not exceed five ohms under normally dry conditions when measured by resistance tester. Resistance values above five ohms shall be brought to ENGINEER's attention. Provide additional ground rods as required to attain a resistance to ground of less than five ohms for each ground grid. Add grounding additive installing additional ground rods to increase their effectiveness.

+ + END OF SECTION + +

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install hangers and supports for electrical systems.
2. Area Classifications: Materials shall be suitable for the area classification(s) shown or indicated on the Drawings, and specified in Section 26 05 05, General Provisions for Electrical Systems.

B. Related Sections:

1. Section 05 05 33, Anchor Systems.
2. Section 26 05 05, General Provisions for Electrical Systems.
3. Section 26 05 33.13, Rigid Conduits.

1.2 REFERENCES

A. Standards referenced in this section are:

1. ASTM A123/A123M, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

1.3 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Detailed installation drawings showing dimensions and compatibility with proposed layout.
2. Product Data:
 - a. Manufacturer's name, product designation, and catalog number of each material item proposed for use.
 - b. Manufacturer's specifications including material, dimensional and weight data, and load capacity for each supporting system component proposed for use.
 - c. Pictorial views and corresponding identifying text of each component proposed for installation.
 - d. Documentation that confirms product compatibility with Laws and Regulations.

- B. Informational Submittals: Submit the following:
 - 1. Certifications:
 - a. Submit certifications required under this Section.
 - 2. Manufacturer's Instructions:
 - a. Manufacturer's installation instructions, including recommended tightening torque values for all nuts and bolts.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Provide products of one of the following:
 - 1. B-Line.
 - 2. Kindorf.
 - 3. Unistrut
 - 4. Or approved equal.

2.2 MATERIALS

- A. Strut, Fittings, and Accessories:
 - 1. General
 - a. Unless otherwise shown or indicated, strut shall be 1-5/8 inches by 1-5/8 inches. Double struts shall be two pieces of the same strut, welded back-to-back at the factory.
 - b. Attachment holes, when required, shall be factory-punched on hole centers approximately equal to the cross-sectional width and shall be 9/16-inch diameter.
 - c. Fittings, braces, brackets, hardware, and accessories shall be Type 316 stainless steel.
 - d. Strut nuts shall be spring captured Type 316 stainless steel.
 - e. Square and round washers shall be Type 316 stainless steel.
 - 2. Strut materials shall be suitable for area classifications indicated in Section 26 05 05, General Provisions for Electrical Systems, and shown or indicated on the Drawings.
 - a. Wet Locations:
 - 1) Strut shall be 12-gauge Type 316 stainless steel.
- B. Hanger Rods:
 - 1. Material:

- a. Dry Locations: All-thread, zinc-coated
 - b. Wet, Corrosive, or Hazardous Areas: Stainless steel.
- 2. Size: Not less than 3/8-inch diameter, unless otherwise shown on the Drawings or specified.
- C. Beam Clamps for Attaching Threaded Rods or Bolts to Beam Flanges for Hanging Struts or Conduit Hangers:
 - 1. Beam clamps shall be stainless steel equipped with stainless steel square head set screw and shall include threaded hole sized for attaching the all-thread rod or threaded bolt.
- D. Miscellaneous Hardware:
 - 1. Bolts, screws, and washers shall be stainless steel.
 - 2. Hex Nuts: Shall be stainless steel and include nylon inserts.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine conditions under which the Work will be installed and notify ENGINEER in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Provide hangers and supports for electrical systems with necessary channels, fittings, brackets, and related hardware for mounting and supporting materials and equipment. Provide anchor systems, concrete inserts, and associated hardware for proper support of electrical systems.
- B. Install equipment and devices on hangers and supports as recommended by manufacturer, shown on the Drawings, as specified, and as required.
- C. Install hangers and supports level, true, free of rack, and parallel and perpendicular to building walls and floors, so that the hangers and supports are installed in a neat, professional, skillful manner.
- D. Holes in suspended ceilings for rods for hangers and supports and other equipment shall be provided adjacent to bars, where possible, to facilitate removal of ceiling panels.
- E. Coordinate installation of hangers and supports with equipment, cabinets, consoles, panels, enclosures, boxes, conduit, cable tray, wireway, busway, cablebus, piping, ductwork, lighting fixtures, and other systems and equipment. Locate hangers and supports clear of interferences and access ways.
- F. Anchor Bolts, Expansion Anchors, and Concrete Inserts: Shall be in accordance with Section 05 05 33, Anchor Systems, and requirements of this Section.

G. Mounting of Conduit:

1. Provide space of not less than 1/4-inch between conduit surfaces and abutting or near surfaces except struts, cable trays, steel beams, and columns.
2. Fasten conduit to struts, cable trays, steel beams, and columns using specified clamps and straps as shown, specified, and required.
3. Devices shall be compatible with size of conduit and type of support. Following installation, size identification shall be visible and legible.
4. Install conduit supports and fasteners in accordance with Section, 26 05 33.13, Rigid Conduits.

H. Supports for Cabinets, Consoles, Panels, Enclosures, and Boxes:

1. Freestanding: Unless otherwise specified or shown on the Drawings, provide supports for floor-mounted equipment, cabinets, consoles, panels, enclosures, and boxes. Such supports shall be 3.5-inch-high concrete equipment base with a 45-degree chamfered edge. Base shall extend two inches beyond outside dimensions of equipment on all sides.
2. Wall-Mounted:
 - a. Provide space not less than 1/4-inch between cabinets, consoles, panels, enclosures, and boxes and the surface on which each is mounted. Provide non-metallic or stainless-steel spacers as required.
 - b. Do not mount equipment, enclosures, panels, and boxes directly to beams or columns. Mount struts to beams or columns using beam clamps, and mount equipment, enclosures, panels, and boxes to the struts.
3. Floor Stand Rack:
 - a. Where equipment, cabinets, consoles, panels, enclosures, and boxes cannot be wall-mounted, provide an independent floor stand rack.
 - b. Floor stand rack shall consist of struts, plates, brackets, connection fittings, braces, accessories, and hardware assembled in a rigid framework suitable for mounting of intended materials and equipment.
 - c. Equip floor stand racks with brackets and bases for rigidly mounting the framework to the ceiling or floor, as applicable; or equip floor stand racks with beam clamps, angle plates, washers, and bolts for fastening to beam flanges, as applicable.

Hangers and Supports for Electrical Systems

- d. When equipment, cabinets, consoles, panels, enclosures, and boxes weigh more than 100 pounds:
 - 1) Main vertical supports of floor stand rack assemblies shall be back-to-back struts.
 - 2) Bracing, clamping, and anchoring of each floor stand rack shall be sufficient to ensure rigidity of the floor stand rack with the intended equipment, enclosures, conduit, cable tray, busway, cable bus, and wireway installed. Floor stand racks shall not be deflected more than 1/8-inch by a 100-pound force applied at any point on the floor stand rack in any direction.
- I. Drilling into beams or columns is not allowed unless authorized by ENGINEER.
- J. Tighten nuts and bolts to the manufacturer's recommended torque values.
- K. Field Cutting:
 - 1. Cut edges of strut and hanger rod shall have rounded corners, edges beveled, and burrs removed. If field cutting the strut is required, use clean, sharp, dedicated tools. Remove oil, shavings, and other residue of cuttings prior to installation.
 - 2. Coatings: To prevent corrosion:
 - a. Coat cut edges with epoxy-base touchup paint.
 - b. Coat cut edges with zinc-rich paint.

++ END OF SECTION ++

SECTION 26 05 33.13

RIGID CONDUITS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals shown, specified, and required to furnish and install conduit and fittings to form complete, coordinated, and grounded raceway systems.
2. When specific, detailed conduit routings for various systems within buildings and other areas are not be shown on the Drawings, CONTRACTOR shall establish routings based on single-line, riser, and interconnection diagrams and other information on the Drawings. CONTRACTOR shall provide for the proper installation of conduits in each system.
3. Conduit types and the installation methods shall comply with the following, unless otherwise shown or indicated in the Contract Documents:
 - a. Use steel conduit (rigid steel or intermediate metallic) for exposed indoor conduit runs in non-corrosive areas.
 - b. Use PVC-coated rigid steel or aluminum conduit for exposed interior or exterior conduit runs in hazardous, wet, and corrosive locations.
 - c. Use PVC-coated rigid steel conduit for individual conduits direct-buried in the ground.
 - d. Use Schedule 40 PVC or steel conduit for concrete-encased duct bank runs.
 - e. Use steel conduit for plant monitoring and control (PMCS) systems, system control and data acquisition (SCADA) systems, and communication systems, regardless of the installation.

B. Coordination:

1. Conduit runs shown are diagrammatic. Coordinate conduit installation with piping, ductwork, light fixtures, and other systems and equipment and locate to avoid interferences.
2. For conduits to be embedded in concrete slabs, confirm adequate slab thickness and coordinate location of conduits with placement of reinforcing steel, waterstops, expansion joints, and other features of the concrete slab.

C. Related Sections:

1. Section 05 05 33, Anchor Systems.
2. Section 26 05 29, Hangers and Supports for Electrical Systems.
3. Section 26 05 53, Identification for Electrical Systems.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ANSI C80.1, Standard for Rigid Electrical Steel Conduit (ERSC).
2. ANSI/NEMA FB1, Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable.
3. NEMA TC2, Electrical Polyvinyl Chloride (PVC) Conduit.
4. NEMA TC3, Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.
5. UL 6, Electrical Rigid Metal Conduit – Steel.
6. UL 514B, Conduit, Tubing, and Cable Fittings.
7. UL 651, Safety Schedule 40 and 80 Rigid PVC Conduit and Fittings.
8. UL 886, Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations.
9. UL 1242, Electrical Intermediate Metal Conduit – Steel.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with the following:

1. NEC Article 342, Intermediate Metal Conduit
2. NEC Article 344, Rigid Metal Conduit.
3. NEC Article 352, Rigid Nonmetallic Conduit.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Assembly details of conduit racks and other conduit support systems.
 - b. Layout drawings showing proposed routing of exposed conduits, conduits embedded in structural concrete, and conduits directly buried in the ground. Shop Drawings shall show locations of pull and junction boxes and penetrations in walls and floors. Shop Drawings of embedded conduits shall include cross-sections showing thickness of concrete

slabs and locations of conduits relative to reinforcing steel, waterstops, and other features of the slab.

2. Product Data:
 - a. Manufacturer's catalog cuts and product data for conduit, fittings, and appurtenances.
- B. Informational Submittals: Submit the following:
 1. Manufacturer's Instructions:
 - a. When requested by ENGINEER, provide copies of manufacturer's recommendations for handling and installing products.
 2. Site Quality Control Submittals:
 - a. When requested by ENGINEER, provide copies of results of specified Site quality control testing.
- C. Closeout Submittals: Submit the following:
 1. Record Drawings:
 - a. Show actual routing of exposed and concealed conduit runs in record documents in accordance with Section 01 78 39, Project Record Documents.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Rigid Steel Conduit, Elbows, and Couplings:
 1. Manufacturers: Provide products of one of the following:
 - a. Allied Tube and Conduit.
 - b. Wheatland Tube Company.
 - c. Western Tube and Conduit Corporation.
 - d. Or approved equal.
 2. Material: Rigid, heavy-wall, mild steel, hot-dip galvanized, smooth interior, tapered threads, and carefully reamed ends; 3/4-inch NPS minimum size.
- B. PVC-coated Rigid Steel Conduit, Elbows, and Couplings:
 1. Manufacturers: Provide products of one of the following:
 - a. Robroy Industries.
 - b. Perma-Cote Industries.
 - c. OCAL, Inc.
 - d. Or approved equal.

2. Material: Rigid, heavy-wall, mild steel, hot-dip galvanized, smooth urethane interior coating, tapered threads, carefully reamed ends, 3/4-inch NPS minimum size with factory exterior coating of 40-mil thick PVC.
 3. Color: Color of coating shall be the same on all conduit and fittings.
- C. Metallic Conduit Fittings, and Outlet Bodies:
1. Manufacturers: Provide products of one of the following:
 - a. Crouse-Hinds Company.
 - b. Appleton Electric Company.
 - c. Or approved equal.
 2. Material and Construction: Cast gray iron alloy, cast malleable iron or aluminum bodies, and covers consistent with conduit material. Units shall be threaded type with five full threads. Materials shall comply with ANSI/NEMA FB1 and be listed by UL. Do not use "LB" fittings. Use type "LBD" fittings where use of fittings is unavoidable.
 3. Use: Conduits shall be gasketed and watertight in hazardous, wet, and corrosive locations.
- D. PVC-coated Conduit Fittings, and Outlet Bodies:
1. Manufacturers: Provide products of one of the following:
 - a. Robroy Industries.
 - b. Perma-Cote Industries.
 - c. OCAL, Inc.
 - d. Or approved equal.
 2. Material and Construction: Cast gray iron alloy, cast malleable iron bodies, and covers with factory coating of 40-mil thick PVC and smooth urethane interior coating. Units shall be threaded type with five full threads. Material shall comply with ANSI/NEMA FB1 and be listed by UL. Do not use "LB" fittings. Use type "LBD" fittings where use of fittings is unavoidable.
 3. Use: Provide PVC-coated or aluminum conduit fittings and outlet bodies in hazardous, wet, and corrosive locations. Fitting material shall be consistent with conduit material.
- E. Non-metallic Conduit and Fittings:
1. PVC Plastic Conduit:
 - a. Manufacturers: Provide products of one of the following:
 - 1) Amoco Chemicals Corp.

- 2) Carlon Electrical Products.
 - 3) Or approved equal.
 - b. Material: Schedule 40 PVC, rated for 90 degrees C, complying with NEMA TC3 and UL 514B and 651.
 - c. Fittings: Form elbows, bodies, terminations, expansions, and fasteners of same material and manufacturer as base conduit. Provide cement by same manufacturer as base conduit.
- F. Conduit Hubs:
 - 1. Manufacturers: Provide products one of the following.
 - a. Myers Electrical Products Company.
 - b. Or approved equal.
 - 2. Material: Threaded conduit hub, vibration-proof, weatherproof, with captive O-ring seal, zinc metal with insulated throat and bonding screw.
 - 3. Use: Provide for all conduit terminations to boxes, cabinets, and other enclosures in areas designated as wet locations.
- G. PVC-coated Conduit Hubs:
 - 1. Manufacturers: Provide products one of the following:
 - a. Robroy Industries.
 - b. Perma-Cote Industries.
 - c. OCAL, Inc.
 - d. Or approved equal.
 - 2. Material: Threaded conduit hub, vibration-proof, weatherproof, with captive O-ring seal, zinc metal with insulated throat and bonding screw, and factory coating of 40-mil thick PVC and smooth urethane interior coating.
 - 3. Use: Provide for PVC-coated steel or aluminum conduit terminations to boxes, cabinets, and other enclosures in areas designated as corrosive location.
- H. Conduit Bushings and Locknuts:
 - 1. Manufacturers: Provide products one of the following:
 - a. O-Z/Gedney.
 - b. Appleton Electric Company.
 - c. Or approved equal.
 - 2. Insulated Bushings: Malleable iron body with plastic liner. Threaded type with steel clamping screw. Provide with bronze grounding lug, as required.

3. Locknuts: Steel for sizes 3/4-inch through two-inch diameter and malleable iron for sizes 2.5-inch through four-inch diameter.
4. Use: Provide for all conduit terminations to boxes, cabinets, and other enclosures except threaded type in areas designated as dusty locations.

I. Thruwall Seals

1. For new construction through exterior subsurface walls and exterior concrete walls.
 - a. Manufacturer: Provide one of the following:
 - 1) Type WSK and WSCS by O-Z/Gedney.
 - 2) Or approved equal.
2. For new construction passing through concrete floors and floor slabs.
 - a. Manufacturer: Provide one of the following:
 - 1) Type FSK and FSCS floor seals by O-Z/Gedney.
 - 2) Or approved equal.
3. For conduits passing through new exterior masonry block walls or through core-drilled holes in existing exterior subsurface walls, exterior concrete walls, floor slabs, and roof slabs, and for conduits passing through existing interior concrete walls or floors and interior masonry block walls.
 - a. Manufacturer: Provide one of the following:
 - 1) Type CSMI sealing bushing at the inside of the structure and Type CSMC sealing bushing at the outside of the structure by O-Z/Gedney.
 - 2) Or approved equal.

2.2 ACCESSORIES

- A. Fasteners: To the extent possible, fastener material shall be consistent with conduit material. For PVC-coated rigid steel conduit runs, fasteners shall have factory applied PVC coating or be stainless steel. Fasten raceway systems to supporting structures using the following:
 1. To Wood: Wood screws.
 2. To Hollow Masonry Units: Toggle bolts, in accordance with Section 05 05 33, Anchor Systems.
 3. To Brick Masonry: Expansion bolts by Price, or equal.

4. To Concrete: Anchors in accordance with Section 05 05 33, Anchor Systems.
 5. To Steel: Beam clamps in accordance with Section 26 05 29, Hangers and Supports for Electrical Systems.
- B. Duct Sealing Compound
1. Soft, fibrous, slightly tacky, non-hardening sealing compound.
 2. Remains workable at all temperatures.
 3. Manufacturer:
 - a. Type DUX by O-Z/Gedney.
 - b. Or approved equal.

2.3 IDENTIFICATION

- A. Conduit Labels:
1. Provide conduit labels in accordance with Section 26 05 53, Identification for Electrical Systems.
- B. Warning Tape:
1. Provide warning tape in accordance with Section 26 05 53, Identification for Electrical Systems.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine conditions under which the Work will be performed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Install in accordance with manufacturer requirements, NFPA 70, Laws and Regulations.
- B. Supports:
1. Rigidly support conduits by clamps, hangers, or Unistrut-type channels. Conduit supports and accessories shall be in accordance with Section 26 05 29, Hangers and Supports for Electrical Systems.
 2. Support single conduits by means of one-hole pipe clamps in combination with one-screw back plates, to raise conduits from the support surface. Support multiple runs of conduits on trapeze type hangers.
- C. Fastenings: Fasten raceway systems rigidly and neatly to supporting structures using specified materials.

D. Exposed Conduit:

1. Install parallel or perpendicular to structural members or walls.
2. Where possible, run-in groups. Provide conduit racks of suitable width, length, and height, arranged to suit field conditions. Provide support every ten feet, minimum.
3. Install on structural members in protected locations.
4. Locate clear of interferences.
5. Provide six inches of clearance from hot fluid lines and ¼-inch from walls.
6. Install vertical runs plumb. Unsecured drop length shall not exceed 12 feet.

E. Underground Conduits:

1. Install individual, underground conduits minimum of 20 inches below grade, unless otherwise shown or indicated.
2. Perform excavation, bedding, backfilling, and surface restoration, including pavement replacement where required, in accordance with Section 31 20 00, Earth Moving, and Section 32 12 00, Flexible Paving.
3. Install warning tape 12 inches below finished grade over buried conduits.

F. Empty Conduits:

1. Install nylon pull wire in each empty conduit and cap conduits not terminating in boxes with permanent fittings designed for the purpose.

G. Field Bends: No indentations. Diameter of conduit shall not vary more than 15 percent at bends.

H. Joints:

1. Apply conductive compound to joints and threaded fittings before assembly.
2. Make up joints tight and ground thoroughly.
3. Use standard tapered pipe threads for conduit and fittings.
4. Cut conduit ends square and ream to prevent damaging wire and cable.
5. Use full threaded couplings. Split couplings are not allowed.
6. Use strap wrenches and vises to install conduit. Replace conduit with wrench marks.
7. Apply zinc-rich paint to exposed threads and other areas of galvanized conduit system where base metal is exposed.

I. Terminations:

1. Install insulated bushings on conduits entering boxes or cabinets, except when threaded hubs are used.
2. Provide locknuts on both inside and outside of enclosure, except when threaded hubs are used.
3. Use of bushings in lieu of locknuts is not allowed.
4. Install conduit hubs on conduits entering boxes or cabinets in wet and corrosive areas.

J. Moisture Protection:

1. Plug or cap conduit ends using manufacturer standard products at time of installation to prevent entrance of moisture and foreign materials.
2. Underground and embedded conduit connections shall be watertight.
3. Thruwall Seals and Conduit Sealing Bushings: Install for conduits passing through concrete slabs, floors, walls, or concrete block walls.
4. Drainage: Conduit runs shall be fully drainable. Where possible, install conduit runs to drain to one end and away from building. Avoid pockets or depressions in conduit runs.
5. Seal conduit openings within control and instrumentation panels and distribution equipment with duct sealing compound to provide watertight seal.

K. Corrosion Protection:

1. Conduit Curb:

- a. For conduits routed in concrete slabs or floors and stub-ups through floor, provide 4" -inch high concrete curb, extending two inches from outer surface of conduit penetrating floor, to prevent corrosion. For floor-mounted equipment, concrete equipment base shall be in lieu of concrete curb.
- b. Conduit stub-ups shall be 90-degree, PVC-coated, rigid, galvanized steel conduit elbow. PVC-coated elbow shall extend a minimum of ½-inch above top of concrete curb or equipment base. Should elbow not reach specified height, provide PVC-coated conduit extension to accommodate specified requirements. Provide coupling or fitting for transition from rigid galvanized steel conduit or PVC conduit in slab to PVC-coated elbow.

- c. For conduits stubbing up and terminating at equipment enclosure mounted on concrete base, provide insulated grounding bushing on PVC-coated rigid steel elbow.
 - d. For conduits stubbing up and extending to boxes, cabinets, and other enclosures above the concrete curb in wet and dusty areas, provide conduit coupling/fittings between the PVC-coated rigid steel elbow and rigid steel conduit for transition between the two conduit types.
 - e. For conduits stubbing up and extending to boxes, cabinets, and other enclosures above the concrete curb or equipment base in corrosive areas, continue conduit system with PVC-coated rigid steel conduit.
- 2. Dissimilar Metals:
 - a. Prevent occurrence of electrolytic action between dissimilar metals.
 - b. Do not use copper products in connection with aluminum, and do not use aluminum in locations subject to drainage of copper compounds on bare aluminum.
 - c. Back paint aluminum in contact with masonry or concrete with two coats of aluminum-pigmented bituminous paint.
- L. Non-metallic Conduit:
 - 1. Install in accordance with manufacturer's recommendations.
 - 2. Provide manufacturer's recommended adhesives or sealants for watertight connections.
 - 3. Provide expansion fittings for expansion and contraction to compensate for temperature variations. Fittings shall be watertight and suitable for direct burial.
 - 4. Transition to PVC-coated rigid steel conduit before making turn up to enclosures.
- M. PVC-coated Rigid Steel Conduit:
 - 1. Install in accordance with manufacturer's recommendations.
 - 2. Install with manufacturer's installation tools to avoid damage to PVC coating.
 - 3. Repair damaged PVC coating with manufacturer's recommended touch-up compound.
- N. Identify conduits, including spares, in accordance with Section 26 05 53, Identification for Electrical Systems.

3.3 FIELD QUALITY CONTROL

A. Site Tests:

1. Test conduits by pulling through each conduit a cylindrical mandrel with length not less than two pipe inside diameters, having an outside diameter equal to 90 percent of conduit's inside diameter.
2. Maintain a record, by number, of all conduits successfully tested.
3. Repair or replace conduits that do not successfully pass testing, and re-test.

+ + END OF SECTION + +

SECTION 26 05 33.16

FLEXIBLE CONDUITS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals shown, specified, and required to furnish and install flexible metallic conduit and fittings.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. UL 360, Liquid-Tight Flexible Steel Conduit.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with the following:

1. NEC Article 350, Liquid-Tight Flexible Metal Conduit.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Product Data:
 - a. Manufacturer's literature and technical information for flexible conduit and fittings proposed for use.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Flexible Conduit (Non-hazardous Areas and Class 1, Division 2, Hazardous Areas):

1. Material: Flexible galvanized steel core with smooth, abrasion--resistant, liquid-tight, polyvinyl chloride cover. Continuous copper ground built in for sizes 3/4-inch through 1.25-inch. Material shall be UL-listed.
2. Products and Manufacturers: Provide one of the following:
 - a. Anaconda Sealtite Type UA by Anamet Electrical, Inc.
 - b. Liqueatite Type L.A. by Electric-Flex Company.
 - c. Or approved equal.

B. Flexible Conduit Fittings:

1. Material and Construction: Malleable iron with cadmium finish. Fittings shall adapt the conduit to standard threaded connections, shall have an inside diameter not less than that of the corresponding standard conduit size and shall be UL listed.
2. Manufacturers: Provide products of one of the following:
 - a. Crouse-Hinds Company.
 - b. Appleton Electric Company.
 - c. Or approved equal.
3. Use: Provide on flexible conduit in non-hazardous and Class 1, Division 2 hazardous areas.

C. PVC-Coated Conduit Fittings:

1. Material and Construction: Malleable iron with standard finish and 40-mil PVC exterior coating. Fittings shall adapt the conduit to standard threaded connections and shall have an inside diameter not less than that of the corresponding standard conduit size.
2. Manufacturers: Provide products of one of the following:
 - a. Robroy Industries.
 - b. Permacote Industries.
 - c. OCAL, Inc.
 - d. Or approved equal.
3. Use: Provide on flexible conduit in areas designated as corrosive locations.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine conditions under which the Work will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Install at motors, transformers, field instruments, and equipment subject to vibration or require movement for maintenance purposes. Provide necessary reducer where equipment furnished cannot accept 3/4-inch diameter flexible conduit. Limit flexible conduit length to three feet maximum.
- B. Install in conformance with manufacturer recommendations, NFPA 70, and the Laws and Regulations.

++ END OF SECTION ++

SECTION 26 05 33.33

PULL, JUNCTION, AND TERMINAL BOXES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install pull, junction, and terminal boxes.

B. Related Sections:

1. Section 26 05 05, General Provisions for Electrical Systems.
2. Section 26 05 29, Hangers and Supports for Electrical Systems.
3. Section 26 05 53, Identification for Electrical Systems.

1.2 REFERENCES

A. Standards referenced in this Section are.

1. AASHTO, Standard Specifications for Highway Bridges.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. NEC Article 314, Outlet, Device, Pull and Junction Boxes; Conduit Bodies; Fittings; and Handhole Enclosures.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Product Data:

- a. Manufacturer's technical information for pull, junction, and terminal boxes proposed for use.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Pull, Junction, and Terminal Boxes:

1. General – Applicable to All Boxes:

a. Description and Performance Criteria:

- 1) Provide pull, junction, and terminal boxes rated at not less than NEMA 12. Boxes shall be appropriate for each location in accordance with NEMA requirements and as required for area classifications

specified in Section 26 05 05, General Provisions for Electrical Systems.

- 2) For flush-mounted pull boxes in slabs or pavement potentially subject to vehicular traffic, boxes and covers shall be constructed for H-20 loading in accordance with AASHTO Standard Specifications for Highway Bridges.
- b. Manufacturers: Provide products of one of the following:
 - 1) Appleton Electric Company.
 - 2) Crouse-Hinds Company.
 - 3) Hoffman Engineering Company.
 - 4) Or approved equal.
- c. Materials: Pull boxes embedded in concrete slabs shall be cast iron.
- e. Terminal strips and terminal blocks in terminal boxes shall be mounted on terminal box sub-panels.
- e. Identification: Boxes shall be identified in accordance with Section 26 05 53, Identification for Electrical Systems.
2. Materials and Construction – Dusty Locations:
 - a. Material: Welded and galvanized sheet steel of USS gage.
 - b. Gasket: Oil-resistant gasket.
 - c. Access: Lift-off hinges and quick-release latches.
 - d. Material Thickness:
 - 1) Boxes with dimension two feet and smaller shall be 14-gage.
 - 2) Boxes with dimension between two and three feet shall be 12 gauge.
 - 3) Boxes with dimension of three feet or more in any direction shall be 10-gage.
3. Materials and Construction - Wet, Corrosive, or Hazardous Locations:
 - a. Rating:
 - 1) Pull boxes in wet, corrosive, or outdoor areas shall be NEMA 4X.
 - 2) Boxes for areas classified as hazardous locations, where required by NEC, shall be explosion-proof and comply with UL 886.
 - b. Material:

Pull, Junction, and Terminal Boxes

- 1) Cast gray iron alloy with hot-dip galvanized finish, or cast malleable iron bodies and covers.
- 2) Large boxes not generally available in cast iron construction shall be copper-free aluminum alloy or Type 316 stainless steel, as required by location.
- 3) In corrosive locations, where the conduit system is PVC-coated, boxes shall be cast metal with factory-applied 40-mil PVC coating, Type 316 stainless steel, or non-metallic thermoplastic or fiberglass reinforced plastic material.

c. Gasket:

- 1) Provide neoprene gaskets for wet and corrosive locations.
- 2) Gaskets shall be an approved type designed for the purpose. Improvised gaskets are not acceptable.

d. Access: Stainless steel cover bolts.

e. Features:

- 1) External mounting lugs.
- 2) Drilled and tapped conduit holes.
- 3) Boxes where conduits enter building or structure below grade shall have 1/4-inch drain hole at bottom of the box.
- 4) Provide threaded connections for explosion proof boxes.

B. Terminal Blocks:

1. Products and Manufacturers: Provide one of the following:
 - a. Allen-Bradley Company, Bulletin, Model 1492.
 - b. General Electric Company, Model CR151K.
 - c. Or approved equal.
2. Material and Construction:
 - a. NEMA-rated nylon modular terminal blocks.
 - b. 600-volt rated.
 - c. Control and alarm circuit terminals shall be screwed type with permanently affixed numeric identifiers beside each connection.
 - d. Power terminals shall be copper and rated for the circuit ampacity.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine conditions under which the Work will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Mount boxes so that sufficient access and working space is provided and maintain clearance of not less than 1/4-inch from walls. Follow manufacturer recommendations and requirements.
- B. Securely fasten boxes to walls or other structural surfaces on which boxes are mounted. Provide independent supports that comply with Section 26 05 29, Hangers and Supports for Electrical Systems, where boxes will not be mounted on walls or other structural surface.
- C. Install pull boxes where shown or indicated, and provide pull boxes where one or more of the following conditions exist:
 - 1. Conduit runs containing more than three 90-degree bends.
 - 2. Conduit runs exceeding 200 feet in length.
- D. Provide removable, flame-retardant, insulating cable supports in boxes with any dimension exceeding three feet.
- E. Field-apply PVC touch-up to scratched PVC boxes damaged during installation. Touch-up work shall be in accordance with manufacturer's recommendations and instructions.
- F. Size junction, pull, and terminal boxes in accordance with NEC Article 314 and other Laws and Regulations.
- G. Provide terminal blocks in boxes where shown and where cable terminations or splices are required.

++ END OF SECTION ++

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals shown, specified, and required to furnish and install identification for electrical apparatus and electrical Work.

B. Related Sections:

1. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables.
2. Section 40 60 05, Process Control Systems General Provisions.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with the following:

1. NEC Article 110, Requirements for Electrical Installation.
2. NEC Article 210, Branch Circuits.
3. NEC Article 215, Feeders.
4. NEC NFPA 70, National Electrical Code.
5. 40 CFR 1910.145 (OSHA) – Specification for Accident Prevention Signs and Tags.
6. NFPA 70E, Electrical Safety in the Workplace.

1.3 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings: Submit the following:
 - a. Complete description and listing of proposed electrical identification and electrical identification devices for associated equipment or systems.
 - b. Conduit and wire identification numbering system and equipment signage.
2. Product Data:
 - a. Manufacturer's literature, cut sheets, specifications, dimensions, and technical data for all products proposed under this Section.

PART 2 – PRODUCTS

2.1 MANUFACTURED UNITS

A. Engraved Identification Devices (Nameplates and Legend Plates):

1. Nameplates:

- a. Laminated thermoset plastic, 1/16-inch thick, engraved condensed block black lettering on white background, square corners, and beveled front edges, or match existing.
- b. Size: As required.
- c. Letter Size: Minimum 3/16-inch.
- d. Nameplates one inch or less in height shall have one mounting hole at each end. Nameplates greater than one inch in height shall have mounting holes in the four corners.

2. Legend Plates:

- a. Legend plates for pushbuttons, pilot lights, selector switches, and other panel-mounted devices shall be large size with dimensions of approximately 2-7/16 inches wide by 2-13/32 inches tall (Allen Bradley large automotive size), plastic, custom engraved with black letters on white background.
 - 1) Provide standard-size legend plates where devices are mounted on motor control centers and spacing of devices precludes using automotive-size legend plates.
- b. Lettering size and line weight shall be the same for all legend plates on the same panel or enclosure. Maximum size shall be 1/4-inch and minimum size shall be 1/8-inch.

B. Safety Signs and Voltage Markers:

1. Low-Voltage Safety Signs:

- a. Products and Manufacturers: Provide one of the following:
 - 1) B-302-86060 by Brady.
 - 2) Or approved equal.
- b. Low voltage safety signs shall be pressure-sensitive vinyl complying with 40 CFR 1910.145, five inches by 3.5 inches in size, and shall read, “DANGER – 480 VOLTS”.

2. Low-Voltage Markers:

- a. Products and Manufacturers: Provide one of the following:
 - 1) CV442xx by Brady.

2) Or approved equal.

- b. Low voltage markers shall be either pressure-sensitive vinyl or vinyl cloth with black lettering on orange background and shall read, “120 VOLTS”, “208 VOLTS”, “120/208 VOLTS”, or “240 VOLTS” as required.

C. Arc-flash Safety Signs:

- 1. Products and Manufacturers: Provide one of the following:
 - a. Brady.
 - b. Or approved equal.
- 2. Warning signs shall be adhesive-backed polyester.
- 3. Refer to Specification 26 05 73- Arc Flash Short Circuit Study and Protective Device Coordination.

D. Voltage System Identification Directories:

- 1. General:
 - a. Directories shall be laminated thermoset plastic, 1/16-inch thick, engraved block black letters on white background, square corners, and beveled front edges.
 - b. Directories shall identify all voltage systems within building or structure.
 - c. Directories shall list the colors that identify ungrounded and grounded conductors of each system.
 - d. Colors shall be in accordance with Section 26 05 19, Low Voltage Electrical Power Conductors and Cables.
 - e. Example Directory Text:

Voltage System Identification		
System	A, B, C	Neutral
277/480	Brown, Orange, Yellow	Gray
120/208	Black, Blue, Red	White

- 2. Large directories for rooms shall have text height not less than 1/2-inch.
- 3. Small directories for equipment shall have text height of not less than 1/4-inch.

E. Conduit Labels:

- 1. Products and Manufacturers: Provide one of the following:
 - a. B-915-xxxxx by Brady.
 - b. Or approved equal.

Identification for Electrical Systems

2. Shall be pre-tensioned acrylic/vinyl construction coiled to completely encircle conduit for conduit up through five-inch diameter, or pre-molded to conform to circumference of conduit six-inch diameter and larger.
3. Attach strap-on style for six-inch diameter conduit with stainless steel springs.
4. Shall be blank for use with custom printed labels.
5. Custom Labels:
 - a. Shall have black lettering on yellow background.
 - b. Shall not contain abbreviations in legend.
 - c. Shall be custom printed on continuous tape with permanent adhesive using thermal printer specified below.

F. Wire Identification:

1. Heat Shrinkable Wire and Cable Labeling System:
 - a. Products and Manufacturers: Provide one of the following:
 - 1) B-341 PS-xxx-2W by Brady.
 - 2) Or approved equal.
 - b. White heat-shrinkable irradiated polyolefin shrink-on sleeves. Labels shall be thermal printed. Labels shall be not less than two inches wide.
2. Wrap-Around Wire and Cable Labeling System:
 - a. Products and Manufacturers: Provide one of the following:
 - 1) THT-XX-427 by Brady.
 - 2) Or approved equal.
 - b. Self-laminating white/transparent self-extinguishing vinyl strips. Length shall be sufficient to provide at least 2.5 wraps. Labels shall be thermally printed and not less than two inches wide.

G. Detectable Underground Warning Tape:

1. Products and Manufacturers:
 - a. Provide one of the following:
 - 1) Indentoline by Brady.
 - 2) Or approved equal.
2. Material: Polyethylene or polyester with detectable metal core and polyester underlamine.

3. Width: Two inches.
4. Color and Labeling: Yellow or red with permanently imprinted black letters: "CAUTION – Buried Electric Line", repeated continuously over full length of tape.

H. Thermal Printing System:

1. Utilize thermal transfer process to provide non-smearing labels and markers.
2. Wire and Cable Markers:
 - a. Portable, Products and Manufacturers: Provide one of the following:
 - 1) TLS2200 by Brady.
 - 2) Or approved equal.
 - b. Desktop, Products and Manufacturers: Provide one of the following:
 - 1) 200M by Brady.
 - 2) Or approved equal.
3. Cable Markers:
 - a. Portable, Products and Manufacturers: Provide one of the following:
 - 1) Handimark by Brady.
 - 2) Or approved equal.
 - b. Desktop, Products and Manufacturers: Provide one of the following:
 - 1) Labelizer PLUS by Brady.
 - 2) Or approved equal.

2.2 FABRICATION

A. Engraved Identification Devices (Nameplates and Legend Plates):

1. Nameplate and legend plate text is preliminary and subject to change pending final review and approval of nomenclature by ENGINEER after start-up and testing.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Provide electrical identification in accordance with manufacturer recommendations and as required for proper identification of equipment and materials according to regulatory or code requirements.

B. Engraved Identification Devices (Nameplates and Legend Plates):

1. Unless otherwise indicated in the Contract Documents, attach permanent nameplates with permanent adhesive and with 3/16-inch diameter, round head, stainless steel machine screws into drilled and tapped holes.
2. Provide nameplate with 1.5-inch-high letters to identify each console, cabinet, panel, or enclosure as shown or indicated.
3. Provide nameplates for field-mounted motor starters, disconnect switches, manual starter switches, pushbutton stations, and similar equipment operating components, which shall describe motor or equipment function, source power, and circuit number.
4. Provide nameplates with 1/2-inch-high letters to identify each junction and terminal box shown or indicated.
5. Push Buttons:
 - a. Provide legend plates for identification of functions.
 - b. Provide nameplates for identification of controlled equipment.
 - c. Provide red buttons for stop function.
 - d. Provide black buttons for other functions.
6. Pilot Lights:
 - a. Provide legend plates for identification of functions.
 - b. Provide nameplates for identification of controlled equipment.
 - c. Shall have lens colors as shown or indicated, matching existing function. Where no color is indicated, provide the following lens colors:

Color	Legend
Green	Running, Open
Red	Stopped, Closed
Amber	Alarm
Blue	Power
White	Status

7. Selector Switches:
 - a. Provide legend plates for identification of functions.
 - b. Provide nameplates for identification of controlled equipment.
8. Panel Mounted Instruments:
 - a. Provide nameplates for identification of function.

Identification for Electrical Systems

9. Interiors of Cabinets, Consoles, Panels, Terminal Boxes, and Other Enclosures:
 - a. Provide nameplates for identification.
 - b. Provide each item inside cabinet, console, panel, terminal box, or enclosure with laminated plastic nameplate as shown on approved Shop Drawings and CONTRACTOR's other submittals. Install nameplates with adhesive.
 - c. Interior items requiring nameplates include:
 - 1) Terminal blocks and strips.
 - 2) Bus bars.
 - 3) Relays.
 - 4) Rear of face-mounted items.
 - 5) Rear of door-mounted items.
 - 6) Interior mounted items that require identification when mounted externally.
 - d. Circuit Breaker Directory:
 - 1) Provide engraved laminated plastic directory listing function and load controlled for each circuit breaker within panel used for power distribution.
10. Re-label existing equipment whose designation have changed.
- C. Safety Signs and Voltage Markers:
 1. Provide safety signs and voltage markers on and around electrical equipment as shown or indicated.
 - a. Install rigid safety signs using stainless steel fasteners.
 - b. Clean surfaces before applying pressure-sensitive signs and markers.
 2. Install low voltage safety signs on equipment doors that provide access to uninsulated 480-volt conductors, including terminal devices.
 3. Install low voltage markers on each terminal box, safety disconnect switch, and panelboard installed, modified, or relocated as part of the Work and containing 120/208 volt conductors.
- D. Voltage System Identification Directories
 1. Provide voltage system identification directories as required by NEC Article 210 and NEC Article 215.
 2. Provide in each electrical room voltage system identification directory mounted on wall or door at each entrance to room.

Identification for Electrical Systems

3. For panelboards, switchboards, motor control centers, and other branch circuit or feeder distribution equipment that are not located in electrical rooms, provide voltage system identification directory mounted on equipment.
 - a. Directories shall be affixed using epoxy glue. Screws or bolts shall not penetrate equipment enclosures.
 - b. Directories shall be readily visible and not obscure labels and other markings on equipment.
- E. Arc-flash Safety Signs:
 1. Provide arc-flash safety signs as required by NEC Article 110.
 2. Provide signs for switchboards, panelboards, motor control centers, and industrial control panels. Provide signs for control panels that contain 480-volt equipment. Provide arc flash warning signs on other equipment where the incident energy is greater than 1.2 calories per square centimeter.
- F. Conduit Labels:
 1. Provide conduits with conduit labels unless otherwise shown or indicated.
 2. Do not label flexible conduit.
 3. Do not label exposed single conduit runs of less than 25 feet between local disconnect switches and associated equipment.
 4. Conduit labels shall indicate the following information:
 - a. Contract Number: Alphanumeric, three or four digits, as applicable.
 - b. Conduit Number: Alphanumeric as shown on the Drawings, as assigned by CONTRACTOR for unlabeled conduits, and in accordance with approved submittals.
 5. Provide conduit labels at the following locations:
 - a. Where each conduit enters and exits walls, ceilings, floors, or slabs.
 - b. Where conduit enters or exits boxes, cabinets, consoles, panels, or enclosures, except pull boxes and conduit bodies used for pull boxes.
 - c. At maximum intervals of 50 feet along length of conduit.
 6. Orient conduit labels to be readable from walking height.
- G. Wire and Cable Identification:
 1. Color-coding of insulated conductors shall comply with Section 26 05 19, Low Voltage Electrical Power Conductors and Cables.

Identification for Electrical Systems

2. Use heat-shrinkable wire labels where wire or cable is terminated. Use wrap-around labels where wire or cable is to be labeled but is not terminated.
3. Do not provide labels for the following:
 - a. Bare (uninsulated) conductors, unless otherwise shown or indicated as labeled.
4. Provide wire and cable labels for the following:
 - a. New, rerouted, or revised wire or cable.
 - b. Insulated conductors.
 - c. Wire and cable terminations:
 - 1) Wire labels shall be applied between 1/2-inch and one inch of completed termination.
 - 2) Apply cable labels between 1/2-inch and one inch of cable breakout into individual conductors.
 - a) Label individual conductors in a cable after breakout as specified for wires.
 - b) Wire or cable existing cabinets, consoles, panels, terminal boxes, and enclosures.
 - 1) Label wires or cables withing two inches of entrance to conduit.
 - c) Wire or cable in junction boxes and pull boxes.
 - 1) Label wires or cables within two inches of entrance to conduit.
 - d) Wire and cable installed in cable tray.
 - 1) Wire and cable shall have labels at maximum intervals of 20 feet.
 - e) Wire and cable installed without termination in electrical manholes.
 - 1) Wire and cable shall have wrap-around labels applied within one foot of existing manhole.
 5. Wire and Cable Identification System:
 - a. Wire and cable labels shall be imprinted with an identifying designator.
 - 1) Wire and cable extending between two devices or items and that does not undergo a change of

Identification for Electrical Systems

function shall be identified by a single unique designator as specified below.

b. Field Wiring:

1) Wire or cable designator shall consist of.

- a) Three left most characters shall consist of the contract number under which wiring, or cable was installed.
- b) Fourth character from the left shall be an asterisk (*), a plus sign (+) or a hyphen (-). Do not use other punctuation symbols in a wire designator.
- c) Remaining characters shall be alphanumeric and make wire designator unique.
- d) Numbering shall reflect actual designations used in the Work and shall be documented in record documents.

c. Cabinet, Console, Panel, and Enclosure Wiring, Internal:

1) New Cabinets, Consoles, Panels, and Enclosures:

- a) Wire and cable inside cabinets, consoles, panels, and enclosures shall have designators as specified in Section 40 60 05, Instrumentation and Control for Process Systems.

6. Modified Cabinets, Consoles, Panels, and Enclosures

- a. New or rerouted wire or cable in existing cabinets, consoles, panels, and enclosures shall be labeled as shown on the Drawings or be assigned a ten-character designator equivalent to field wire designator. Follow NFPA 79 requirements.

H. Wire and Cable Identification:

1. Label panel side of terminal to match panel wire number.
2. Label field side of terminal to match field wire number. Terminal number shall not include the Contract number.

I. Terminal Strip Labeling:

1. Label panel side of terminal to match panel wire number.
2. Label field side of terminal to match field wire number. Terminal number shall not include the Contract number.

++ END OF SECTION ++

SECTION 40 60 05

INSTRUMENTATION AND CONTROL FOR PROCESS SYSTEMS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish, install, calibrate, test, start-up, and place in satisfactory operation modifications to the complete and operating instrumentation and control system. Scope of work includes:
 - a. Furnishing all components required for the Control Panels at both treatment plants including the enclosure, processor, relays, and associated equipment.
 - b. Field mounting of instrumentation.
 - c. Integrating of new process control equipment into new control panel, including programming of new and existing PLCs
 - d. Programming of new and existing OITs
 - e. Communications to/from the new Control Panels to the Owner's SCADA system.
 - f. Modifications to existing plant SCADA System

B. Coordination:

1. Instrumentation and Controls:
 - a. Instrumentation and Controls equipment as shown and specified herein shall be furnished, installed, and placed into satisfactory operation by an Instrumentation and Controls subcontractor. Programming of PLCs and configuration of OIT software is part of the work and shall be programmed and configured by an owner approved programmer.
 - b. The Input/Output List (I/O List) in this section identifies the I/O required for the Alum Control Panel. The I/O List is for coordinating signals between field instrumentation and equipment provided by other suppliers.
2. To centralize responsibility, materials and equipment provided under this Section shall be furnished by a single Supplier.
3. CONTRACTORS shall assume responsibility for adequacy and performance of materials and equipment provided under this section.
4. CONTRACTOR shall perform all work described in this section per the OWNER's SCADA System Standards.
5. To the greatest extent possible, provide materials and equipment from a

single manufacturer.

6. Other contractor's responsibilities:
 - a. Prepare all instrumentation and control equipment submittals in accordance with the contract documents.
 - b. Proper interfacing of instrumentation and control equipment with field equipment, instruments, devices, and panels, including required interfacing with packaged control systems furnished by other equipment suppliers, and required interfacing with the Site's electrical system.
 - c. Review and coordination with manufacturers, Suppliers, and other contracts of Shop Drawings and other CONTRACTOR submittals for equipment, valves, and appurtenances for ensuring proper interfacing of hardware, and locations and installation requirements of inline devices and instrument taps.
 - d. Direct, detailed oversight of installation of instruments, panels, consoles, cabinets, wiring and other components, and related wiring and piping connections. Reinstallation or replacement of any instrumentation and controls component or electrical conduit and wiring resulting from absence of detailed oversight shall be provided at no additional cost to the OWNER.
 - e. Calibrating, source quality control, field quality control, and start-up of the system.
 - f. Responsibility for correction period obligations for instrumentation and control system.
 - g. Training of operations and maintenance personnel in operation and maintenance (including calibration and troubleshooting) of the instrumentation and control system.

C. Related Sections:

1. Division 01, General Requirements
2. Division 26, Electrical

1.2 REFERENCES

A. Definitions:

1. General: Definitions of terminology related to Instrumentation and Industrial Electronic Systems used in the specifications shall be as defined in IEEE 100, ISA S51.1, and NEMA ICS 1.
2. Two-Wire Transmitter: A transducer which derives operating power supply from the signal transmission circuit and requires no separate power supply connections. A two-wire transmitter produces a 4 to 20 milliampere current regulated signal in a series circuit with a 24-volt direct current driving potential and a maximum circuit resistance of 600 ohms.

3. Panel: An instrument support system which may be a flat surface, a partial enclosure, or a complete enclosure for instruments and other devices used in process control systems including consoles, cabinets, and racks. Panels provide mechanical protection, electrical isolation, and protection from dust, dirt, moisture, and chemical contaminants which may be present in the atmosphere.
4. Data Sheets: Data sheets shall refer to ISA S20 or ISA TR20.00.01.
5. Signal Types: Used in systems specified in Division 40
 - a. High-Level Analog: Signals with full output level greater than 100 millivolts but less than 30 volts, including 4-20 mA transmission.
 - b. Discrete Control or Events: Dry contact closures and signals monitored by solid state equipment, relays, or control circuits.
 - c. Low Voltage Discrete Control or Events: Dry contact closures and signals monitored by solid state equipment, relays, or control circuits operating at less than 30 volts and 250 milliamperes.
 - d. Digital Code: Code information from the output of an analog to digital converter or digital transmission terminal.
6. I&C contractor: A firm engaged in the business of detailed control system design and engineering, instrumentation component purchase, system and panel assembly, programming, and implementing the specified process control and industrial automation systems.

B. Reference Standards

1. This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.
2. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids).
3. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.
 - a. IEEE 100, Standard Dictionary of Electrical and Electronic Terms
 - b. ISA S5.4, Instrumentation Loop Diagram
 - c. ISA S20, Specification Forms for Process Measurement and Control Instrumentation, Primary Elements, and Control Valves
 - d. ISA S51.1, Process Instrumentation Terminology

- e. ISA TR20.00.01, Specification Forms for Process Measurement and Controls Instrumentation, Part 1: General Considerations
- f. NEMA ICS 1, General Standards for Industrial Control and Systems
- 4. The following organizations have generated standards that are to be used as guides in assuring quality and reliability of components and systems; govern nomenclature, define parameters of configuration and construction, in addition to specific details in this Specification and the Contract Drawings:
 - a. ISA, Instrument Society of America.
 - b. API, American Petroleum Institute.
 - c. UL, Underwriters' Laboratories, Inc.
 - d. AWWA, American Water Works Association.
 - e. NRC, Nuclear Regulatory Commission.
 - f. NEMA, National Electrical Manufacturers Association.
 - g. OSHA, Occupational Safety and Health Administration.
 - h. ANSI, American National Standards Institute.
 - i. MIL, Military Standards.
 - j. NFPA, National Fire Protection Association.
 - k. SAMA, Scientific Apparatus Manufacturers Association.
 - l. JIC, Joint Industrial Council.
 - m. IEEE, Institute of Electrical and Electronic Engineers.
 - n. NEC, National Electrical Code.
 - o. FM, Factory Mutual.

1.3 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

a. Field Instruments:

- i. Manufacturer's product name and complete model number of devices proposed for use, including manufacturer's name and address.
- ii. Instrument tag number in accordance with the Contract Documents.
- iii. Data sheets and manufacturer's catalog literature. Provide data sheets in accordance with ISA 20 and annotated for features proposed for use. For instruments not included in ISA 20, submit data sheets using a format similar to ISA 20.
- iv. Description of construction features.
- v. Performance and operation data.
- vi. Installation, mounting, and calibration details; instructions and recommendations.
- vii. Service requirements.

- viii. Dimensions of instruments and details of mating flanges and locations of closed tanks, pipe sizes for insertion instruments, and upstream/downstream straight run pipe lengths required.
 - ix. Range of each device and calibration information.
 - x. Descriptions of materials of construction and listing of NEMA ratings for equipment.
 - b. Field Wiring and piping diagrams, include the following:
 - i. Wire and pipe size and type
 - ii. Terminal numbers at field devices and in panels
 - iii. Color coding.
 - iv. Conduit numbers in which wiring will be located.
 - v. Locations, functional names, and manufacturer's designations of items to which wiring to piping are connected.
 - c. Electrical control schematics in accordance with NFPA 79. Drawings shall be in accordance with convention indicated in Annex D of the NFPA 79. Typical wiring diagrams that do not accurately reflect actual wiring to be furnished are unacceptable. Tables or charts for describing wire numbers are unacceptable.
 - d. Stock list or bill of materials for each panel including tag number, functional name, manufacturer's name, model number and quantity for components mounted in or on the panel or enclosure.
 - e. Instrumentation and Controls Equipment:
 - i. Submit the following general information:
 1. Detailed block diagram showing system hardware configuration and identifying model numbers of system components.
 2. Software listings for operating system, applications, and HMI.
 3. Software language and organization.
 4. Format, protocol and procedures for data transmission and communications with input/output modules and peripheral devices, including wide area network (WAN) or local area network (LAN).
 - 5. Input/Output Information:
 - a. Input/output (I/O) point listing with I/O module cross-reference identification.
 - b. I/O module cross-reference identification based on I/O address list developed by I&C Subcontractor.
 - 6. Database listing, including all I/O points.
 - f. Complete point-to-point interconnection wiring diagrams of field wiring associated with the system. Diagrams shall include the following:
 - i. Field wiring between each equipment item, panel, instruments, and other devices, and wiring to control stations, panelboards, and motor starters. Some of this equipment may be specified in other Divisions, CONTRACTOR is responsible for providing

complete point-to-point interconnection wiring diagrams for control and monitoring of that equipment.

- ii. Numbered terminal block and terminal identification for each wire termination.
- iii. Identification of assigned wire numbers for interconnections. Assign each wire a unique number.
- iv. Schedule showing the wiring numbers and the conduit number in which the numbered wire is installed.
- v. Junction and pull boxes through which wiring will be routed.
- vi. Identification of equipment in accordance with the Contract Documents.

2. Product Data:

- a. Product data for field instrumentation in accordance with requirements for Shop Drawings in this section.
- b. Product data for field wiring and piping provided for instrumentation and control service and not included under other Sections or contracts.

3. Samples:

- a. Sign-off sheets to be used at time of testing.

B. Informational Submittals: Submit the following:

- 1. Manufacturer's Instructions:
 - a. Shipping, handling, storage, installation, and start-up instructions.
- 2. Source Quality Control Submittals:
 - a. Factory test reports and results.
- 3. Field testing reports.
 - a. Installation inspection and check-out report.
 - b. Submit detailed written report of results of each visit to Site by I&C Subcontractor's service technician, including purpose and time of visit, tasks performed, and results obtained. Submit within two days of completion of visit to the Site.

C. Closeout Submittals: Submit the following:

- 1. Operations and Maintenance Data:
 - a. Submit in accordance with Section 01 78 23, Operation and Maintenance Data.
 - b. Include complete up-to-date system software documentation. Provide hardcopy and electronic copies.
 - c. Include acceptable test reports, maintenance data and schedules, description of operation, wiring diagrams, and list of spare parts recommended for one year of operation with current price list.
 - d. Final calibration sheets for each installed instrument signed by factory-authorized technician.

2. Record Documentation:

- a. Prepare and submit record documents in accordance with Section 01 78 39, Project Record Documents.
- b. Revise all system Shop Drawing submittals to reflect as-built conditions in accordance with the following.
 - 1) Two copies of each revised Shop Drawings and documentation to replace previously issued or out-dated drawings and documentation contained in operation and maintenance manuals. Submit half-size black line drawings for each drawing larger than 11 inches by 17 inches. Include specific instructions for out-dated drawing removal and replacement with record documents submittal.
 - 2) Half-size black line prints of wiring diagrams applicable to each control panel shall be placed in clear plastic envelopes and stored in a suitable print pocket or container inside each control panel.
 - 3) Submit CADD drawings of the point-to-point interconnection wiring diagrams updated to reflect final as-built equipment information and as-installed field installation information.

1.4 STORAGE AND HANDLING

- A. Prior to packaging, each manufacturer or Supplier shall securely attach tag number and instructions for proper field handling and installation to each instrument. Comply with Section 01 65 00, Product Delivery Requirements, and Section 01 66 00, Product Storage and Handling Requirements.

PART 2 – PRODUCTS

2.1 SYSTEM REQUIREMENTS

- A. Power Supplies:
 1. Electrically powered equipment and devices shall be suitable for operation on 115-volt plus-or-minus 10 percent, single-phase, 60 Hertz plus-or-minus two Hertz, power supply. If different voltage or closer regulation is required, provide suitable regulator or transformer at no additional cost to OWNER.
 2. Provide appropriate power supplies for field instruments requiring power source less than 115 volts. Power supplies shall be mounted in control panels or enclosures installed near associated instrument or in field panels.
 3. Power supplies shall be capable of minimum of 130 percent of maximum simultaneous current draw.
 4. Provide power on-off switch or air circuit breaker for each item provided under this Section that requires electric power.

B. Signal Requirements:

1. Control system shall use four to 20 mA DC analog signals, unless otherwise shown or indicated.
2. Provide signal converters and repeaters where required. Adequately size power supplies for signal converters and repeater loads.
3. Isolate signals from ground.
4. Signals transient DC voltage shall not exceed 300 volts over one millisecond and shall not have a DC component over 300 volts.
5. Discrete signals shall use 120 VAC.

C. Surge Protection Requirements:

1. Provide surge protection to protect electronic instrumentation and control systems from surges propagating along signal and power supply cabling. Protection systems shall be such that the protection level shall not interfere with normal operation, but shall be lower than instrument surge withstand level, and be maintenance-free and self-restoring.
2. Provide instruments in suitable metallic cases, properly grounded. Ground wires for surge protectors shall be connected to good earth ground and, where practical, run each ground wire individually and insulated from other wires. Mount protectors within instrument enclosure or in separate junction box compatible with the area designation coupled to the enclosure.

D. Miscellaneous:

1. General:
 - a. Instrumentation components shall be heavy-duty types, constructed for continuous service.
 - b. System shall consist of equipment models currently in production.
 - c. Materials and equipment, including cabling and interconnections, shall be in accordance with Division 16, Electrical, and manufacturer's recommendations, unless indicated otherwise in the Contract Documents.
 - d. Materials and equipment shall, where applicable, be in accordance with UL standards and be so marked and labeled.
2. Provide surge protection for instruments and other control system components that could be damaged by electrical surges. Provide lightning arresters on both ends of communication lines, except for fiber optic cabling, external to buildings or structures, including leased telephone lines and similar communication lines.
3. Field-mounted instruments and system components shall be constructed for use in humid and corrosive service conditions. Field-mounted instrument enclosures, junction boxes and appurtenances shall have NEMA rating appropriate for hazardous rating requirements shown or indicated on

Electrical Drawings, instrument data sheets, and elsewhere in the Contract Documents.

4. Miscellaneous hardware such as fittings, fasteners, and screws, be Type 316 stainless steel or other appropriate material to prevent galvanic reactions, and shall be suitable for service intended. Piping stands shall be provided for fastening instruments as required. Provide threaded pipe stands with flange bolted to slab. Use carbon steel piping and flanges painted in accordance with Section 09 90 00, Coatings.
5. Data processing equipment and relays with interconnections to field devices shall be wired through field wiring terminal blocks in the panel. Terminals as part of relay base are unacceptable.
6. Arrange panel-mounted instruments, switches, and other devices ergonomically for functional use and ease of maintenance. Similar types of panel-mounted devices shall be by one same manufacturer and of the same model line.
7. Equipment furnished shall be of modular construction and be capable of field expansion through installation of plug-in circuit cards and additional cabinets as necessary.
8. Field- and panel-mounted instruments shall be tagged with equipment number and nomenclature indicated in the Contract Documents; if not so indicated, tag in accordance with approved Shop Drawings.
9. Coordinate ranges and scales specified in the Contract Documents with manufacturer of the equipment actually furnished for operability over the intended range. Complete the coordination prior to submitting Shop Drawings to ENGINEER.
10. Treat field-mounted devices with anti-fungus spray.
11. Protect field-mounted devices from exposure to high and freezing temperatures to provide complete operability under the environmental conditions indicated in the Contract Documents.

E. Environmental Conditions:

1. Provide control system suitable for continuous operation under the following conditions:
 - a. Indoor Instruments:
 - 1) Ambient Temperature: Zero degrees F to 120 degrees F.
 - 2) Relative Humidity: 100 percent, maximum.
 - b. Outdoor Instruments
 - 1) Ambient Temperature: -15 degrees F to 120 degrees F.
 - 2) Relative Humidity: 100 percent, maximum.
2. Protect outdoor-mounted field instruments from direct sunlight by providing sunshade for instruments. Construct sunshade out of non-corrosive material. Sunshade shall withstand wind velocity of 70 miles per hour.

2.2 PANELS

A. General Provisions:

1. Provide electrical components and devices, support hardware, fasteners, and interconnecting wiring and piping required to provide control panels complete and operational.
2. Locate and provide hardware so that connections can be easily made and there is ample room for servicing each item.
3. Prevent movement by adequately supporting and restraining devices and components mounted on or within panel.
4. Provide panels with sub-panels for installation of all internally mounted hardware.
5. Provide numbered terminal strips for terminating field wiring and wiring from other panels, unless otherwise shown or indicated.
6. Provide copper grounding studs for hardware requiring grounding.
7. Provide the following convenience accessories inside each panel:
 - a. One 120 vac, 20-amp duplex, grounding type receptacle.
 - d. Duplex receptacle shall have a dedicated circuit breaker.
9. Panels to be located in non-hazardous (non-classified) environments shall comply with UL 50 and UL 508A.
10. CONTRACTOR is responsible for detailed layout and design of panels, in accordance with the Contract Documents. Base cutouts and design on instrument manufacturers' requirements.
11. Provide easily accessible pocket built into panel door to enclose "as built" panel wiring diagrams.
12. Panels shall be UL-listed.

B. Identification:

1. Provide laminated plastic nameplate for identification of panels. Use self-tapping stainless-steel screws for fastening nameplates to panels. When self-tapping screws may degrade panel's NEMA rating, retain NEMA rating intact by using gaskets on each side of panel surface and use retaining plate on the panel back that is same size as nameplate. When gaskets and retaining plate are used, use full-penetration screws with nuts.
2. Panel identification nameplates shall have 1/2-inch high engraved letters.
3. Tag electric components and devices mounted within panels with high adhesive labels.
4. Identify terminal strips with nameplate engraved as "TB-XX" where "XX" is the numerical identification of terminal strip.
5. Identify terminals within each terminal strip with sequential numbers and wire numbers.

6. Internal panel wiring shall be color-coded and numerically identified with unique wire numbers affixed at each end of each wire. Color coding shall be in accordance with panel wiring color code table, below:

Panel Wiring Color Code Table

Description	Color
110 vac panel power before fuses or breakers	Black
Controlled 110 vac power (e.g., after relay contacts, selector switch contacts, and similar equipment.)	Red
110 vac power source from devices external to panel	Yellow
110 vac neutral	White
24 vdc positive power from power supplies	Brown
24 vdc negative power from power supplies	
Controlled 24 vdc power (e.g., after PLC output contacts, relay contacts, and similar)	Blue
24 vdc positive power from devices external to panel	Orange
24 vdc negative power from devices external to panel	
24 vdc four to 20 mA DC signal cable	Grey with red positive, clear negative
Grounding wire	Green

C. Panel Construction Features:

1. Control panels located in non-environmentally controlled areas and outdoor areas shall be rated NEMA 4X and with the following features:
 - a. Panels shall be Type 316L stainless steel construction with minimum thickness of 12-gage for all surfaces, except areas requiring reinforcing, with a smooth-brushed finish.
 - b. Stainless steel screw clamp assemblies on three sides of each door.
 - c. Rolled lip around three sides of door and along top of enclosure opening.
 - d. Hasp and staple for padlocking.
 - e. Provide clear-plastic, gasketed lockable hinged door to encompass non-NEMA 4X front-of-panel devices.

D. Electrical Systems:

1. Power Source and Internal Power Distribution:
 - a. Provide in the panel, near where incoming power is terminated, nameplate with panel power supply source, type, voltage, and circuit number.
 - b. Protect incoming 120 vac power feeds to power the panel by providing lightning and surge arrestors, properly connected to grounds.
 - c. Provide panels with internal 120 vac power distribution system with properly-sized and -rated circuit breakers to distribute power. Power not more than six devices from a single breaker. When power supplies are included in the panel, not more than two power supplies shall be powered from a single breaker. Convenience receptacles and interior panel lights shall have their own breakers. When one or more field

instruments require 120 vac power from the panel for instrument power, power not more than three instruments from a given breaker.

- d. Provide space for a minimum of two spare breakers in each panel.

2. Electrical Systems:

- a. Internal wiring shall be Type MTW and THW stranded copper wire with thermoplastic insulation rated for 600 volts at 85 degrees C for single conductors, color-coded and labeled with wire identification.
- b. For DC signal wiring, use shielded cable with 18-gage conductors. DC field signal wiring terminal strips shall be capable of handling wires up and including No. 12 size.
- c. For AC power wiring, use No. 12 minimum AWG. For AC signal and control wiring, use No. 16 minimum AWG. For wiring carrying more than 15 amps, use sizes required by the NEC (NFPA 70) .
- d. Inside of panels, route DC signal wiring separately from power wiring with minimum separation distance of six inches.
- e. Use covered Panduit to route internal panel cables and wiring. Panduit in each section of panel shall be appropriately sized to accommodate the quantity of wires to be routed with a spare capacity of 40 percent.
- f. Install wire troughs inside panels along horizontal or vertical routes to present a neat appearance. Angled runs are unacceptable.
- g. Wiring that is routed without Panduit shall be adequately supported and restrained to prevent sagging or other movement. Use of adhesive anchors to support or restrain wiring is unacceptable.
- h. Terminate internal panel wiring using forked, insulated, crimp-on connectors; soldered connectors are unacceptable. Provide panels with 600-volt rated barrier type terminal strips mounted on Din rails. Identify terminal strips as indicated in this Section. Identification devices shall be self-stick, plastic tape strips with permanent, machine-printed numbers.
- i. Wiring in panels shall be installed such that, if wires are removed from any one device, power will not be disrupted to other devices.
- j. Provide spare terminals equal in number to 20 percent of terminals used for each type of wiring (e.g., DC signal and AC power).
- k. Provide ground terminals to terminate the shield wire of shielded cables. Termination of more than two shielded wires on a single ground terminal is unacceptable.
- l. Provide a single copper bus bar with 5/16-inch diameter copper grounding stud to connect the panel to external ground. Panel's internal grounds shall be terminated to the bus bar.
- m. Where wires pass through panel walls, provide suitable bushings to prevent cutting or abrading of insulation.
- n. When DC power or low voltage AC power is required, furnish and install in the panel required power supplies and transformers.

- o. Provide complete wiring diagram of “as-built” circuitry enclosed in transparent plastic.
- 3. Provide complete wiring diagram of “as-built” circuitry enclosed in transparent plastic.

2.3 PANEL HARDWARE AND COMPONENTS

A. PLC Hardware

1. Hardware

- a. Requirements:
 - i. Power Supply: 120VAC/24VDC
 - ii. Screen Size: minimum 7in touchscreen
 - iii. I/O: PLC controller
 - iv. Connectivity: Ethernet
- b. Manufacturer:
 - i. Allen-Bradley
 - ii. Or equivalent compatible with existing FCWS system.

2.4 PRIMARY SENSORS AND FIELD INSTRUMENTS

A. Level Transmitter - Radar Type

- B. Type: Microprocessor based, non-contacting, radar type continuous liquid level measuring system consisting of an antenna with attached transmitter. The radar liquid level measuring system shall produce an output signal linear with level.

C. Performance Requirements:

- 1. Range: As specified in the Instrument Index.
- 2. Local Indication: Identical to Range.
- 3. Accuracy: 0.1 percent of range.
- 4. Reaction Time: One second, minimum.
- 5. Vibration Resistance: 20 to 2000 Hz.
- 6. Power: 24 VDC loop power.
- 7. Output: Isolated 4 to 20 mADC, into 0 to 550 ohms.
- 8. Process Pressure (maximum): 150 lbs.
- 9. Ambient Temperature Limits:
 - a. Transmitter: -40 to 176 degrees F.
 - b. Antenna/seal: -40 to 150 degrees F

D. Construction Features:

- 1. Enclosure:
 - a. NEMA 4X.
 - b. Enclosure material: Powder coated aluminum.
- 2. Electrical Connection: 1/2-inch NPT.
- 3. Mounting: Six-inch flange mounting.

E. Products and Manufacturers: Provide the following:

- 1. VEGA VEGAPULS 21
- 2. Or Equal

2.5 IDENTIFICATION

A. Input/Output List Identification

1. I/O point list contains information required to configure PLC I/O interface hardware, and to indicate range conversion or signal functions.
2. "POINT NUMBER" is an alphanumeric character string. For example, for the point "MP-FI-806-0123" the following apply:
 - a. The first two characters (MP) refer to the specific plant area (MP = Main Pump, for example).
 - b. The third character is the functional identifier and conforms with ANSI/ISA S5.1. In the example, "F" represents flow.
 - c. The fourth (and sometimes fourth and fifth) alphabetical character (I) is the function identifier. In the example, the "I" represent indication input.
 - d. The first three-digit number (806) identifies the P&ID number.
 - e. The next four-digit number (0123) identifies the loop or field device.
 - f. Suffix, where required, is used for distinguishing between similar variables.
3. "DESCRIPTION" is an alphanumeric character string up to 40 characters in length. Points described as "SPARE" indicate pre-wired I/O.
4. "SIGNAL TYPE" is one of the following:
 - a. AI indicates analog input.
 - b. DI indicates discrete input.
 - d. AO indicates analog output.
 - e. DO indicates momentary, maintained or latched discrete output.

C. ISA Identification

1. A = Miscellaneous Analytical.
2. B = Burner, Combustion.
3. C = Chlorine Residual/Gas.
4. D = Density.
5. E = Voltage.
6. F = Flow.
7. G = Intrusion.
8. H = Hand.
9. I = Current.
10. J = Power.
11. K = Time.
12. L = Level.
13. M = Motor.
14. N = pH.
15. O = Oxygen.
16. P = Pressure.
17. Q = Quantity.

18. R = Radioactivity.
19. S = Speed, Frequency.
20. T = Temperature.
21. U = Common.
22. V = Vibration.
23. W = Torque (Weight or Force).
24. X = Hazardous Gas.
25. Y = Event, State or Presence (Switch Position).
26. Z = Position, Dimension.

C. Function Identifier:

1. A = Available / In Auto (input)
2. B = Backward Rotation (input)
3. C = Full Closed (input)
4. D = Full Open (input)
5. E = Close/Energize (output)
6. H = High (input)
7. I = Input (Analog)
8. L = Low (input)
9. N = Open (output) or Control Mode (input)
10. O = Output (Analog)
11. R = Running (input)
12. S = Start (output)
13. T = Stop (output)
14. U = Malfunction or Alarm (input)
15. V = Slow (output)
16. W = Slow (input)
17. X = Selector Switch (input)

2.6 SOURCE QUALITY CONTROL

A. Panel Operational Testing

1. Test all input/output components to verify that internal panel wiring is properly terminated at correct locations. Verify initial ranges and settings.
2. Test all system hardware and software to verify proper operation as stand-alone units. Test shall include, but not be limited to, the following:
 - a. Power distribution and breaker ratings to match approved Shop Drawings.
 - b. Power fail/restart tests.
 - c. Diagnostics checks.
 - d. Demonstrate that all specified equipment functional capabilities are working properly.

- e. Check and verify process displays are in accordance with approved Shop Drawings.
- 3. Test components and devices requiring data transmission to verify that communication between such components is working properly. Verify communication by using the same media required for the completed system at the Site as indicated in the Contract Documents.
- 4. Perform integrated system test with all system equipment and simulated inputs/outputs connected to verify that equipment is performing properly as an integrated system.
- 5. Simulation devices shall be of suitable quality to not mask control panel defects.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine conditions under which the Work will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Environmental Requirements:
 - 1. Do not install instruments in areas where construction may cause instrument to be damaged, without providing adequate protection for said instrument.
- B. Installation of Instrumentation:
 - 1. Secure field-mounted instruments to stands or brackets in accordance with manufacturer's recommendations, approved or accepted (as applicable) submittals, and the Contract Documents.
 - 2. Locate sensors where shown on the Drawings. Confirm exact locations in the field with ENGINEER to maximize accessibility.
 - 3. Install all devices so that devices are readily accessible for service and do not cause potential hazards.
- B. Services and Operator Instructions
 - 1. Provide repairs or replacement of defective materials, equipment or workmanship, including with respect to equipment, the services of factory-trained servicemen.
 - 2. In addition to the calibration required for check-out, provide two additional calibrations on all instruments. The first re-calibration shall be

approximately six months after acceptance of the system, and the second shall be approximately eleven months after acceptance. As part of each calibration, provide two copies of the calibration sheets, a detailed list of deficiencies (should any be found), and a statement that the entire system is in proper operation and condition (except for the deficiencies noted) and shall be turned over to the OWNER.

3.3 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. System Check-Out and Start-Up Responsibilities:

- a. CONTRACTOR shall perform check-out and start-up of all system components.
- b. Check and approve the installation of all instrumentation and control system components and all cable and wiring connections between the various system components prior to placing the various processes and equipment into operation.
- c. CONTRACTOR shall provide all test equipment necessary to perform the testing during system checkout and start-up.
- d. CONTRACTOR shall furnish ENGINEER an Installation Inspection Report certifying that all equipment has been installed correctly and is operating properly. The report shall be signed by an authorized representative of the CONTRACTOR.

B. Loop Status Reports: Each loop shall have a Loop Status Report to organize and track its inspection, adjustment, and calibration. These reports shall include the following information and check-off items with spaces for sign-off by the CONTRACTOR and OWNER:

1. Project Name, Test Date, name of the person whom the CONTRACTOR authorized to conduct the test and CONTRACTOR Name.
2. Loop Number.
3. Tag Number for each component.
4. Check-offs/sign-offs for each component: Tag/identification; installation; termination (wiring and tubing); scale, range, and setpoint as applicable; and calibration/adjustment (four-point for analog, set point for switches) rising and falling.
5. Check-offs/sign-offs for the loop: Panel interface terminations; I/O interface terminations; I/O signal operation; inputs/outputs operational (received/sent, processed, adjusted); total loop operation; process controller scaling and adjustment; and space for comments.

C. Loop Checks:

1. CONTRACTOR shall test all I/O from the field device to the PLC terminals and verify that the PLC has received the signal.
 2. Loop checks shall be documented using OWNER approved Input/Output Status Sign-Off forms.
- D. Functional Test:
1. CONTRACTOR shall demonstrate operation of each device and the connection to the PLC and SCADA System. Test operation of pumps, valves, and instruments locally, at RTU, and remotely using FCWS SCADA system.

+ + END OF SECTION + +

NO.	I/O TAG	DESCRIPTION	SIGNAL TYPE	INPUT FROM / OUTPUT TO	CONTROL PANEL	DRAWING REFERENCE
1	LIT-721	S. FAYETTE TANK 721 LEVEL INDICATOR	AI	TRANSMITTER / ALUM CONTROL PANEL	ALUM CONTROL PANEL	I-02
2	LH-721	S. FAYETTE TANK 721 LEVEL ALARM HIGH	DI	TRANSMITTER / ALUM CONTROL PANEL	ALUM CONTROL PANEL	I-02
3	LHH-721	S. FAYETTE TANK 721 LEVEL ALARM HIGH HIGH	DI	TRANSMITTER / ALUM CONTROL PANEL	ALUM CONTROL PANEL	I-02
4	LIT-723	S. FAYETTE TANK 723 LEVEL INDICATOR	AI	TRANSMITTER / ALUM CONTROL PANEL	ALUM CONTROL PANEL	I-02
5	LH-723	S. FAYETTE TANK 723 LEVEL ALARM HIGH	DI	TRANSMITTER / ALUM CONTROL PANEL	ALUM CONTROL PANEL	I-02
6	LHH-723	S. FAYETTE TANK 723 LEVEL ALARM HIGH HIGH	DI	TRANSMITTER / ALUM CONTROL PANEL	ALUM CONTROL PANEL	I-02
7	AIT-720	S. FAYETTE RAPID MIX ANALYZER	AI	ANALYZER / ALUM CONTROL PANEL	ALUM CONTROL PANEL	I-02
8	FIT-720	S. FAYETTE ALUM PUMP FLOW PACING	AO	ALUM PUMP / ALUM CONTROL PANEL	ALUM CONTROL PANEL	I-02
9	FIT-721	S. FAYETTE ALUM FLOW METER	AI	FLOW METER / ALUM CONTROL PANEL	ALUM CONTROL PANEL	I-02
10	LIT-701	CROSSTOWN TANK 701 LEVEL INDICATOR	AI	TRANSMITTER / ALUM CONTROL PANEL	ALUM CONTROL PANEL	I-03
11	LH-701	CROSSTOWN TANK 701 LEVEL ALARM HIGH	DI	TRANSMITTER / ALUM CONTROL PANEL	ALUM CONTROL PANEL	I-03
12	LHH-701	CROSSTOWN TANK 701 LEVEL ALARM HIGH HIGH	DI	TRANSMITTER / ALUM CONTROL PANEL	ALUM CONTROL PANEL	I-03
13	LIT-703	CROSSTOWN TANK 703 LEVEL INDICATOR	AI	TRANSMITTER / ALUM CONTROL PANEL	ALUM CONTROL PANEL	I-03
14	LH-703	CROSSTOWN TANK 703 LEVEL ALARM HIGH	DI	TRANSMITTER / ALUM CONTROL PANEL	ALUM CONTROL PANEL	I-03
15	LHH-703	CROSSTOWN TANK 703 LEVEL ALARM HIGH HIGH	DI	TRANSMITTER / ALUM CONTROL PANEL	ALUM CONTROL PANEL	I-03
16	AIT-700	CROSSTOWN RAPID MIX ANALYZER	AI	ANALYZER / ALUM CONTROL PANEL	ALUM CONTROL PANEL	I-03
17	FIT-700	CROSSTOWN ALUM PUMP FLOW PACING	AO	ALUM PUMP / ALUM CONTROL PANEL	ALUM CONTROL PANEL	I-03
18	FIT-701	CROSSTOWN ALUM FLOW METER	AI	FLOW METER / ALUM CONTROL PANEL	ALUM CONTROL PANEL	I-03

I/O COUNT	
AI	8
AO	2
DI	8
DO	0

SECTION 40 61 96

PROCESS CONTROL DESCRIPTIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Definition:

1. The purpose of this document is to describe the proposed control philosophy and control system approach for the FCWS Alum System Upgrade, modifying the existing process control system at both the Crosstown WTP and South Fayette WTP. This document describes the proposed control system, including monitoring requirements, control capabilities and general control system and operator interface computer station (otherwise referred to as a Human Machine Interface, or HMI) layout for the modifications. The existing controls including graphics that are not impacted by this project are to remain as is unless required for screen navigation. Graphics for the new elements shall follow the appearance, color codes, and functionality of the existing graphics.
2. The process controls to be implemented as part of this project includes the elements shown on the drawings including but not limited to the following:
 - a. Alum Tank Level
 - b. Alum Feed Pump Rate Control
 - c. Associated alarms and interlocks
 - d. PLC input and output assignments, register mapping, HMI tagging and existing screen graphic modifications, which shall follow the existing PLC code for similar layout, function, and documentation.

B. Scope:

1. CONTRACTOR shall furnish control strategy diagrams, configuration sheets and control strategy descriptions as shown, specified and required to configure the system complete and operational.
2. CONTRACTOR shall perform all programming, configuration and tuning of the control system.
3. The PCS shall monitor and control the systems contained within the facility in accordance with this specification section and the manufacturer recommendations. The control descriptions and instrumentation drawings describe the required monitoring and control of equipment furnished as part of the Work, which may include multiple locations of control including at the equipment, at PLC panels, at OITs, and at HMI.
4. The CONTRACTOR shall be responsible for the programming and configuration of the PLC, OIT, HMI, and network hardware. The CONTRACTOR HMI programming is to provide graphical control of equipment from the locations shown.

C. Related Sections:

1. Section 40 60 05, Instrumentation and Control for Process Systems
2. Section 40 61 93, Process Control System Input/Output List

1.2 GENERAL CONTROL PHILOSOPHY:

A. Control System Description:

1. The control system shall consist of HMIs, OITs, and Programmable Logic Controllers (PLC). The Controllers shall be configured and programmed to control all systems either manually or automatically, based on monitored data, commands and set points entered by operators at the HMIs. For maintenance mode only, control of equipment shall be possible from local control stations or control panels located at or near the equipment.
2. The control strategies are written descriptions of process control for the unit processes and mechanical or electrical equipment controls required for safe operation. Control strategies shall reside in the memory of the designated processor.

B. Local Control Mode:

1. All equipment shall have local manual control capability at or near the equipment. Equipment that can also be controlled remotely by the PLC shall have a HAND/OFF/AUTO selector switch at that piece of equipment to select control location. If the selector switch is in the HAND position, the local manual control shall be enabled, and the remote control and PLC control will be disabled.

C. Remote Control Mode:

1. When the HAND/OFF/AUTO selector switch for the equipment that can be controlled remotely is in the AUTO position, the remote control and PLC control shall be enabled, and the local manual control shall be disabled.
2. In some cases, there are multiple levels of control. In the case of a VFD driven pump, for example, local control is provided by a Local Control Station (LCS) or Local Control Panel (LCP) at or near the piece of equipment. However, the VFD is also capable of operating the equipment. The OITs and HMIs, together, form the remote control.
 - a. When the HAND/OFF/AUTO switch on the LCS is in HAND, the equipment shall be controlled via START and STOP pushbuttons on the LCS. A VFD can also take over control by flipping the LOCAL/REMOTE switch on it to LOCAL.
 - b. When the HAND/OFF/AUTO switch on the LCS is in the AUTO mode, the PLC shall be allowed to control the equipment based on control values entered by the operator. The PLC shall control the equipment in either an HMI Manual or a PLC Auto mode of operation, as selected by the operator at the HMI.

- 1) HMI Manual Control: The HMI Manual mode of control requires operator action at the HMI to change the operating status of the piece of equipment.
 - 2) PLC Auto Control: PLC Auto control allows the PLC to control the equipment based on operator-entered set points and measured values.
 - 3) Out of Service: In this mode, selected at the HMI, the equipment is considered unavailable by the control system. Indicate at the HMI equipment that is out of service and manage alarms accordingly.
3. Control Modes:
- a. Remote Manual control: It shall be possible for the Operator to interrupt any sequence, loop, or automatic operation and operate the same manually through the HMI or OIT
 - b. Output Verification: This control function shall verify that the equipment has responded to the digital commands before proceeding to the next step during automatic operation. If any discrepancy is detected, an alarm shall be annunciated.
 - c. System Initialization Routine: Each processor shall have an initialization routine to initialize all system variables.
- D. Protective Interlocks:
1. Equipment protective, hardwired interlocks shall remain in effect in all control modes.
- E. Control System Configuration:
1. The PLC and HMIs shall be located as shown on the and building layout drawings.
 2. At each HMI, graphic displays shall provide detailed, user-friendly information on all equipment, and shall allow the operator to initiate process changes or respond to alarm conditions as shown on the drawings with this description.
 3. The information contained within each PLC connected to the network shall be fully available on the control system network for viewing on the HMIs within the control rooms. The monitoring and control functions shown on the drawings represent the minimum required information to be programmed into the HMI screens.
 4. Each PLC shall be programmed to be a standalone unit that will control the equipment connected to it, even if the communication between the PLC and the HMI is severed. In this case, the PLC shall use the previously entered set points to control the equipment. The specified requirements within this section are for the modifications to the program for the new requirements.
 5. All set points, tuning parameters and engineering scales shall be documented for each control point and each control strategy on configuration sheets or similar documentation. These configuration sheets with initial data shall be submitted for review, shall be updated before the factory test and available at the factory test, and shall be updated during startup and commissioning. The

record documents shall be submitted showing the final version of the configuration sheets.

F. Process Control Functions:

1. Process control function shall be structured to permit the realization of all control strategy requirements. In addition, each control function shall be designed so that non-disruptive (bumpless and balance free) transfers are obtained during operating mode changeover and initialization. Where applicable, user changeable parameters shall be automatically defaulted to a preset value if a specific value is not given during system operation.
2. The P&IDs represent the required process monitoring and control. The required control for the system is a combination of the representation on the P&IDs and the requirements specified herein. The P&IDs do not show all the required internal diagnostic indications for the systems. In addition to the indications shown on the P&IDs, the following, at a minimum shall be provided, including internal diagnostic functions, indications, analog signal conversions and discrete signal verifications:
 - a. Indication of bad quality on any hard-wired input/output point (such as zero milliamps on a 4 to 20 mA DC circuit). Bad quality points shall be excluded from average calculations.
 - b. Individual PLC fault indications. (Controller Fault)
 - c. Indication of a communications failure. With the high quantity of Ethernet-connected devices, provide heartbeats and watchdog timers to detect loss of communications to MCCs, VFDs, and other devices.
 - d. Cumulative runtime indicators shall be provided for all equipment.
 - e. Adjustable startup and shutdown delay timers shall be provided to allow normal startup and shutdown of equipment without alarms or bypassing of hardware safety interlocks.
 - f. Controller fault- individual controller fault indication.
 - g. Network communication failure- Indication of communication failure at each process network node or processor.
 - h. Track and hold- for analog control loops, when control of field equipment is not in "remote mode" the associated PID controller output shall track the position feedback.
 - i. Analog alarms: for all analog signals, provide the following alarm indications. These settings shall be adjustable based on security login.
 - 1) High-high
 - 2) High
 - 3) Low
 - 4) Low-low
 - 5) High rate of change, low rate of change.
 - j. Follow the ISA 18.2 standard for the definition of and basis for alarms.
3. If any equipment faults or shuts down through an interlock, the cause of the alarm/shutdown must be corrected and the alarm must be acknowledged in the HMI prior to restart.

4. All equipment shall be controlled independently of each other when operated in manual unless otherwise indicated.
 5. When equipment is operated in HMI Manual Mode, the HMI shall prompt the operator for their input and provide warning to the operator with messages displayed on the screen. These messages shall be to assist in the proper sequencing of equipment startup.
 6. Each control function shall be implemented using the programmable hardware in the designated processor. No functions shall be developed using hardwired relay logic.
 7. The following shall be provided in addition to the indications above.
 - a. ANALOG DATA SCALING: This control function shall scale all analog inputs to a common span and shall normalize the digital representation of each analog input to a percent of the operating span. The processed value shall be expressed as a binary number that specifies the analog input's position on a straight line lying between zero and full scale as defined for a given input by the zero and span values in the data base.
 - b. AMPLITUDE LIMIT CHECK: This control function shall perform dual level, high/low amplitude limit checking and shall identify a limit violation every time a measured or virtual variable goes out-of-limits and returns back into limits. The control function shall determine the time at which each limit excursion occurred. A dead band shall be provided on each limit and shall be expressed as a percentage of span or in engineering units. Low and high limiting default values shall be set-up for each measured or calculated variables used in the process control loops.
 - c. ENGINEERING UNIT CONVERSION: This control function shall convert scaled analog data to engineering units by means of the following equation:

$$Y = (H - L) (D/DH) + L$$
 where:
 Y = value in engineering units
 H = high value of span, expressed in engineering units
 L = low value of span, expressed in engineering units
 D = digitized scaled input value in counts
 DH = full scale digitized value in counts
 8. All equipment shall be controlled independently of each other when operated in manual unless otherwise indicated.
- G. Hardware: CONTRACTOR shall provide all the hardware, as shown, specified, or required to implement the control strategies as described.
- H. Configuration: All set points, tuning parameters, and engineering scales shall be

documented for each control point and each control strategy on configuration sheets or similar documents. These documents shall be updated during Factory Testing and finally during start-up.

- I. Control Strategy Displays: Control strategy displays shall be submitted for review. Displays shall clearly show initial conditions, start, and progression of the control strategies. Each control strategy shall be displayed in a minimum number of displays for ease of monitoring by the Operator.
- J. Plant Power Failure: Plant equipment controlled by the control system shall be programmed to automatically reset upon failure. The reset and restart sequence shall be enabled through the PCS. When power is restored select process equipment as approved by the ENGINEER shall be permitted to restart.
- K. Restart: Equipment and motors that can safely be restarted shall be automatically restarted after power failure by the control system in an orderly time delayed sequence approved by the ENGINEER. Equipment that requires Operator intervention shall be prompted for restart following power restoration.
- L. All relays, tuning parameters, scales, configuration values, mathematical constants, equations, and set points given in the control strategies are adjustable over a wide range. The values given are initial and may change during Shop Drawing review and may have to be readjusted during start-up.

1.3 MANDATORY PROCESS INTEGRATION WORKSHOPS

- A. Standards Workshops: The OWNER desires HMI and OIT systems that meet the OWNER'S Standards and that are similar in "look and feel" to the OWNER'S other HMI systems including existing graphics. To that end, the CONTRACTOR is required to attend and implement results from multiple workshops with the OWNER. The purpose of the workshops shall be to follow existing standards, documentation, editing and discuss their specific application to this project. The following workshops will be held, attended by the CONTRACTOR and OWNER and OWNER REPRESENTATIVE(S) to further define and detail to the CONTRACTOR the OWNER'S requirements for display and control. Each workshop shall be for at least two (2) hours and no more than four (4) hours. The workshops will be scheduled by the OWNER and OWNER's Program Manager and will be scheduled prior to the field modifications. The CONTRACTOR and I&C System Supplier shall be required to attend. Where the OWNER has defined standards, examples and templates will be distributed at the workshops in the form of OIT images and existing PLC code. (Note: The following list is intended to provide the CONTRACTOR with an indication of the number and content of each workshop. The OWNER reserves the right to change the order, add to or modify the content of any workshop as required.)
 - 1. Standards Workshop 1: HMI Graphics Configuration Part I

- a. Graphic Template (Decide with OWNER the template for screen display, location of global/local information), HMI server application.
 - b. Hierarchy (Decide with OWNER the hierarchy for system linking on the project, including overviews, main menus, sub menus, context sensitive menus, etc.)
 - c. Graphic Display Wizards/Galaxies (Decide with OWNER required symbols to be used for field devices/equipment, and how different status/alarms would be displayed)
 - d. Colors (Decide with OWNER color requirements for systems/processes)
 2. Standards Workshop 2: HMI Graphics Configuration Part II
 - a. Alarm and Event Handling (Decide with OWNER the escalation and display requirements for events and alarms, including grouping, priorities, and method of annunciation.)
 - b. Security Access Levels: maintain existing.
 3. Standards Workshop 3: Historical Information
 - a. Process Trending (Decide with OWNER the required data to be trended, and the frequency of collection for PCS data)
 - b. Alarm and Event Capture (Decide with OWNER the required alarms and events to captured within the PCS Historian)
 4. Standards Workshop 4: Regulatory Items
 - a. Review with OWNER the specific requirements for regulatory systems, including alarm handling for regulatory alarms, data handling for regulatory systems, formats of reports, etc.
- B. Project Workshops: The OWNER desires to review and comment on each HMI system graphic and bring together Operations and Maintenance staff to review use and application of the PCS HMI. To that end, the CONTRACTOR is required to demonstrate each control strategy and its related HMI/OIT graphics. The purpose of the workshops will be to allow OWNER stakeholders to review and comment on the representation of process equipment, process flows, information requirements, placement of objects on the screen, etc. All comments will be compiled and the CONTRACTOR shall be expected to respond to and implement changes. For each system defined in this Section in Part 3 (suffixed items such as 17A, 17B, 17C can constitute as a single system for scheduling purposes), the CONTRACTOR is expected to provide a two (2) hour initial demonstration, and one (1) hour follow up demonstration to confirm implemented changes. At the meetings, the I&C System Supplier/programmer, shall attend.

1.4 SUBMITTALS

- A. The control strategies are written descriptions of the basic configuration and/or programming required to implement regulatory and sequential control of the unit processes as shown on the P&IDs. They do not in all cases describe the process characteristics fully. Finalizing and tuning of strategies, as required, by process characteristics shall be accomplished during start-up. Control strategies shall fully

reside in the memory of the designated PLC. The process inputs/outputs referred to in the Control Strategies are shown on the P&IDs.

- B. CONTRACTOR shall furnish control strategy diagrams, configuration sheets and control strategy descriptions as shown, specified and required to configure a complete and operational system. They shall incorporate revisions to the Contract P&IDs, these control descriptions, the I/O listing, interlocks, alarms, reporting requirements and manufacturer equipment requirements shall be prepared for each process system by the CONTRACTOR and submitted for review by the ENGINEER at the following phases:
1. Shop drawing review.
 2. Factory test/ Field Test
 3. Following system startup and commissioning.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 ALUMINUM SULFATE STORAGE AND FEED SYSTEM

A. General:

1. The aluminum sulfate system includes two bulk storage tanks and three metering pumps located in the Chemical Building.
2. The aluminum sulfate is fed as the coagulant upstream of the rapid mix.
3. Each of the bulk storage tanks shall be equipped with a level sensor and transmitter, and high and high-high level alarm indications mounted on a local fill station control panel.
4. A local control panel for control and monitoring of the alum system shall be provided.
5. Metering pumps shall have integral drive controls with control keypad.

B. Local Control:

1. The storage tanks shall be filled manually by the operator manually opening the fill station valve of each tank. The levels shall be monitored at the local fill panel and verified by level gauges on each storage tank. High Level alarm shall be indicated by an indicating light on the Fill Panel and by an audible alarm; the alarm shall be silenced by depressing the Acknowledge pushbutton. High-High level alarm shall be indicated by a High-High Level indicating light, audible alarm, and strobe. The audible alarm shall be silenced by the Acknowledge pushbutton, but the strobe shall remain active until tank level is below the High-High level setting.
2. The metering pumps shall be started and stopped via controls on the metering pump. The metering pump feed rates shall be controlled from the metering pump when the metering pump HAND/OFF/AUTO selector switch(s) is in the HAND position.

C. Remote Control - Manual/Auto Modes:

1. The metering pumps shall be monitored from SCADA. The metering pumps shall be started and stopped via controls on the HMI when the metering pump HAND/OFF/AUTO selector switch(s) is in the AUTO position. When in HMI Manual or PLC Auto mode, the metering pumps shall be controlled from SCADA.
2. The feed rate shall be adjusted in either HMI Manual mode or PLC Auto mode, as selected from the HMI. The SCADA output signal to the metering pump (feed rate in gallons per hour) shall be scaled from zero to the maximum capacity setpoint entered by the operator from the HMI.
3. In HMI Manual mode, the operator shall enter the desired feed rate in gallons per hour (adjustable range 0 to maximum capacity setpoint) and the plant control system shall control the metering pumps accordingly.
4. In PLC Auto mode, SCADA shall calculate the feed rate based on an operator entered dosage setpoint, concentration setpoint, and the raw water flow, according to the following formula:

$$FR = (RWF \times DOS) / (CONC \times SG \times 24)$$

where:

FR = feed rate (gal/hr)

RWF = raw water flow (MGD)

DOS = dosage setpoint (mg/L as $Al_2(SO_4)_3$)

CONC = concentration setpoint (%)

SG = specific gravity

5. Setpoints can be adjusted based in part on the streaming current measurements.

D. Monitoring:

1. See I-02 and I-03 or I/O list for Aluminum Sulfate Storage System I/O points that shall appear on SCADA.

++ END OF SECTION ++