PROJECT MANUAL

RAW WATER INTAKE PUMP STATION IMPROVEMENTS 2025

FOR

CITY OF ALCOA, TN

Project No. D231747TN.02

DECEMBER 2025

CONTRACT DOCUMENTS

FOR

CONSTRUCTION AND INSTALLATION OF

RAW WATER INTAKE PUMP STATION IMPROVEMENTS 2025

FOR

CITY OF ALCOA, TN

NOVEMBER 2025

CONSOR ENGINEEERS
1111 N. Northshore Drive, Ste 320
Knoxville, TN 37919
(865) -252-6989

SECTION 00 01 07 - SEALS PAGE
FOR
RAW WATER INTAKE PUMP STATION IMPROVEMENTS 2025
FOR
CITY OF ALCOA, TN

General

CAC STAMP Structural

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FOR
RAW WATER INTAKE PUMP STATION IMPROVEMENTS

FOR
THE CITY OF ALCOA, TENNESSEE

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CONSTRUCTION DRAWINGS
Attached

END OF SECTION

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ADVERTISEMENT FOR BIDS

Sealed Bids for construction and installation of the City of Alcoa Raw Water Intake Pump Station Improvements 2025, will be received until **2:00 p.m., local time on January 7, 2026** and at that time opened and publicly read aloud. Bids mailed or otherwise delivered for this project shall be addressed to City of Alcoa, Attention: David Marcum, Senior Civil Engineer, 725 Universal Street, Alcoa, TN 37701. Email bids shall be addressed to David Marcum, dmarcum@cityofalcoa-tn.gov. Any Bids received after the specified time will not be considered. The Bidder is responsible for the timely delivery of their bid.

The Project consists of replacing a manually operated butterfly valve at the discharge of one of the raw water intake pumps, replacing the gate actuator of the intake sluice gate, replacing a submerged coarse bar screen at the intake structure, addition of a screen deflector unit, associated electrical work, temporary bypass pumping, and all other associated support work as described within these documents and associated drawings.

Work associated with the bar screen replacement shall be conducted in submerged river conditions by a duly licensed and certified diving team/contractor, along with any necessary river restoration work to mount the new screen to the wall. Temporary bypass pumping shall be provided outside the intake pump station building utilizing the river (suction source) and existing bypass infrastructure (discharge) on the existing raw water pipeline. The temporary bypass pumping shall be utilized during any proposed system downtime.

The Work will be completed as defined in the contract Agreement.

Bidding Documents can be requested from Engineer and transferred via electronic transfer.

Each Bid must be submitted on the prescribed Bid Form and accompanied by Bid security as prescribed in the Instructions to Bidders.

Successful Bidder will be required to furnish the additional bond(s) and insurance prescribed in the Bidding Documents.

Bidders are not required to be prequalified by Owner to perform the type and size of Work contemplated herein.

In order to submit a Bid, Bidders shall comply with the requirements listed in the Instructions to Bidders.

For information concerning the proposed Work, please contact :

Consor Engineering: Marios Georgiou, marios.georgiou@consoreng.com, (828) 280–3123.

Owner's Representative:

David Marcum, dmarcum@cityofalcoa-tn.gov , (865) 380-4806.

Attendance at a pre-bid conference is a mandatory requirement of submitting a Bid for this Project. A pre-bid conference will be held on **December 16th, 2025, at 10:00 a.m**. local time at the Alcoa Water Treatment Plant, 302 Sam Houston School Road, Maryville, TN 37804. Refer to Instructions to Bidders for additional information.

Owner's right is reserved to reject all Bids or any Bid not conforming to the intent and purpose of the Bidding Documents.

END OF SECTION

SECTION 00 21 13 - INSTRUCTIONS TO BIDDERS

1.1 DEFINED TERMS

A. 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:

1. *Issuing Office*—The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered. City of Alcoa Public Works, 725 Universal Street, Alcoa, TN 37701.

1.2 COPIES OF BIDDING DOCUMENTS

A. Complete sets of the Bidding Documents in the number and for the deposit sum, if any, stated in the Advertisement for Bids may be obtained from the Issuing Office.

B. Complete sets of Bidding Documents shall be used in preparing Bids. Neither Owner nor Engineer assumes responsibility for errors or misinterpretations resulting from use of incomplete sets of Bidding Documents.

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

1.3 QUALIFICATIONS OF BIDDERS

A. In order to perform public work, Bidder and its Subcontractors, prior to award of Contract or as otherwise required by the jurisdiction, shall hold or obtain such licenses as required by State Statutes, and federal and local Laws and Regulations.

B. Bidder shall have successfully completed projects of similar size and complexity. Provide project name, date of completion, and client contact information.

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

D. Bidder shall not be in violation of any tax laws.

E. Bidder shall have a drug-testing program.

1.4 REGISTRATION REQUIREMENTS

A. In order to submit a Bid, a person, partnership, corporation, or joint venture shall have a current, valid license issued by the State of Tennessee.

1.5 EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE

A. Subsurface and Physical Conditions:

1. Supplementary Conditions identify the drawings and reports known to Owner for this Site.

B. Copies of reports and drawings referenced will be made available by Owner to any Bidder on request. The "technical data" contained therein upon which Bidder is entitled to rely as provided in Paragraph 5.03 of the General Conditions has been identified and established in Paragraph 5.03 of 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. Costs associated with making available copies of reports and drawings shall be borne by Bidder.

C. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraph 5.03 through Paragraph 5.05 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents as a result of any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 5.06 of the General Conditions.

D. On request, Owner will provide each Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates.

E. Safety: Paragraph 7.12.C of the General Conditions indicates that if an Owner safety program exists, it will be noted in the Supplementary Conditions.

F. It is responsibility of each Bidder before submitting a Bid to:

1. Examine and carefully study the Bidding Documents, other related data identified in the Bidding Documents, and any Addenda.

2. Visit the Site to become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

3. Become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

4. Consider the information known to Bidder; 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 Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on:

    a. Cost, progress, and performance of the Work.

    b. Means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques,

sequences, and procedures of construction expressly required by the Bidding Documents.

c. Bidder's safety precautions and programs.

5. Agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price(s) Bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

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

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

8. Determine Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance of the Work.

G. Submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this article; that without exception the Bid is premised upon performing and furnishing the Work required by Bidding Documents and applying specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by Bidding Documents; that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder; and that Bidding Documents are generally sufficient to indicate and convey understanding of terms and conditions for performing and furnishing the Work.

1.6 PREBID CONFERENCE

A. A mandatory pre-bid conference will be held at 10:00 a.m. local time on December 16, 2025 at 302 Sam Houston School Rd, Maryville, TN 37804 . Representatives of Owner and Engineer will be present to discuss the Project. Bidders are required to attend and participate in the conference. Engineer will transmit to prospective Bidders of record such Addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

1.7 SITE AND OTHER AREAS

A. The Site is identified in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor.

1.8 ENVIRONMENTAL AND NATURAL RESOURCES LAWS AND REGULATIONS

A. Bidder's attention is directed to the Supplementary Conditions for ordinances and regulations dealing with the prevention of pollution and preservation of natural resources which may affect the performance of the Work. Bidder shall take such ordinances and regulations into consideration in preparation and submission of its Bid.

1.9 INTERPRETATIONS AND ADDENDA

A. All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by the office issuing documents as having received the Bidding Documents. Questions received less than 7 days prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

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

1.10 BID SECURITY

A. Bid shall be accompanied by Bid security made payable to Owner in an amount of 5 percent of Bidder's maximum Bid price and in the form of a certified check, bank money order, or a penal Bid bond (on the attached form), issued by a surety meeting the requirements of Paragraph 6.01 of the General Conditions.

1. In addition to types of Bid security listed above, the following will also be acceptable: Irrevocable letter of credit or cashier's check.

B. The Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within the time period specified in Article Signing of Agreement, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults. Bid security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of the 7th day after the Effective Date of the Agreement or the number of days specified for all Bids to remain subject to acceptance in Article Bids to Remain Subject to Acceptance, whereupon Bid security furnished by such Bidders will be returned.

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

1.11 CONTRACT TIMES

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

1.12 LIQUIDATED DAMAGES

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

1.13 SUBSTITUTE AND "OR-EQUAL" ITEMS

A. The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or "or-equal" items. Whenever it is specified or described in the Bidding Documents that a substitute or "or-equal" item of material or equipment may be furnished or used by Contractor if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the Effective Date of the Agreement.

1.14 SUBCONTRACTORS, SUPPLIERS, AND OTHERS

A. The Contract requires Bidders for public improvement projects exceeding $100,000 in Contract Price to submit First-Tier Subcontractor Disclosure Form with Bid, or within 2 working hours of Bid closing. Disclosure form identifies first-tier Subcontractors that will furnish labor or labor and materials equal to 5 percent of Contract Price or $15,000 whichever is greater, or $350,000, regardless of percentage of Contract Price. Disclosure form not submitted with Bid or within 2 working hours of Bid closing will cause Bid to be considered nonresponsive.

B. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute acceptable 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.

C. 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, Suppliers, individuals, or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to revocation of such acceptance after the Effective Date of the Agreement as provided in General Conditions Paragraph 7.06.E.

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

1.15 WAGE RATES- NOT APPLICABLE

1.16 PREPARATION OF BID

A. With each copy of the Bidding Documents, Bidder will be furnished one separate unbound copy of the Bid Form, and, if applicable, the Bid Bond Form. No substitution of the Bid Form will be allowed.

B. All blanks on the Bid Form shall be completed by typing or printing with ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each Bid item listed therein or the words "No Bid," "No Change," or "Not Applicable" entered.

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

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

E. A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.

F. A Bid by an individual shall show the Bidder's name and official address.

G. A Bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be shown.

H. All names shall be typed or printed in ink below the signatures.

I. The Bid shall contain an acknowledgement of receipt of all Addenda; the numbers of which shall be filled in on the Bid Form.

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

K. The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder's state contractor license number and class, if applicable, shall also be shown on the Bid Form.

1.17 BASIS OF BID; COMPARISON OF BIDS

A. Lump Sum: Bidders shall submit a Bid on a lump sum basis as set forth in the Bid Form.

B. Unit Price:

1. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the Bid Schedule.

2. The total of all estimated prices will be the sum of the products of the estimated quantity of each item and the corresponding unit price. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.

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

C. The basis of award shall be on the lowest bid total amount (base bid plus alternates).

1.18 SUBMISSION OF BID

A. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the following data:

1. Bidder's Experience: Successfully complete projects of similar size and complexity.

a. Include project name, date of completion, extent work and client contact information.

2. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids.

3. Contractor's License No.:_____.

4. First-Tier Subcontractor Disclosure Form

B. A Bid shall be submitted no later than the date and time prescribed, and at the place indicated in the Advertisement for Bids. Enclose Bid in a plainly marked package with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), name and address of Bidder, and accompanied by the Bid security and other required documents.

1. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED."

2. As an alternate, Bids may be submitted electronically to **David Marcum** dmarcum@cityofalcoa-tn.gov **,** provided the same information is included. Electronic Bids must be received by the same time as sealed Bids and have the same requirements listed for hard copy Bids.

1.19 MODIFICATION AND WITHDRAWAL OF BID

A. A Bid may be modified or withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids.

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

1.20 OPENING OF BIDS

A. Bids will be opened at the time and place indicated in the Advertisement for Bids and unless obviously nonresponsive, read aloud publicly. An abstract of the amounts of the base Bids will be made available to Bidders after the opening of Bids.

1.21 BIDS TO REMAIN SUBJECT TO ACCEPTANCE

A. 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.

1.22 EVALUATION OF BIDS AND AWARD OF CONTRACT

A. Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be responsible. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.

B. In In addition to the bid amount, additional factors will be considered as an integral part of the bid evaluation process, including, but not limited to:

1. The Vendor's experience, reputation, efficiency, judgment, and integrity.

2. The quality, availability and adaptability of the requested products or services.

3. The Vendor's ability to provide future maintenance and/or services.

4. Any other applicable factors as the City determines necessary and appropriate (which may be requested by the city prior to award).

C. More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.

D. In evaluating Bids, Owner will consider whether or not 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. The City holds the right, in its judgment, to award the contract to the vendor(s) which it feels is in the best interest of the City. If a contract is to be awarded, the Contractor/Vendor selection shall be based in whole or in part on the evaluation noted above. No submittal shall be withdrawn for a period of sixty (60) days subsequent to the opening of bids without the consent of the City of Alcoa.

E. In evaluating Bidders, Owner may consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted either with the Bid, or otherwise prior to issuance of the Notice of Award.

F. Owner may conduct such investigations as Owner deems necessary to establish responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work in accordance with the Contract Documents.

G. If the Contract is to be awarded, Owner will award the Contract to Bidder whose Bid is in the best interests of the Project.

1.23 CONTRACT SECURITY AND INSURANCE

A. Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to bonds and insurance. When Successful Bidder delivers executed Agreement to Owner, it shall be accompanied by such bonds.

1.24 SIGNING OF AGREEMENT

A. When Owner issues a Notice of Award to Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement along with the other Contract Documents that are identified in the Agreement as attached thereto. Within 15 days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within 10 days thereafter, Owner shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

1.25 RETAINAGE

A. Provisions concerning retainage and Contractor's rights to deposit securities in lieu of retainage, if applicable, are set forth in the Agreement.

END OF SECTION

SECTION 00 31 00 - AVAILABLE PROJECT INFORMATION

1.1 SUMMARY

A. The following documents are included under Exhibit A- Procurement Information at the end of the technical specifications:

1. EJCDC Contract Reassignment Documentation

a. Agreement Between Buyer and Seller
b. Payment Bond
c. Performance Bond
d. Standard General Conditions
e. Supplementary Conditions

B. Available project information has been furnished by Owner to Engineer for use in designing this Project.

1. Each Bidder shall be fully familiar with available project information, which has been prepared for Owner by separate consultants.

2. Available project information is offered solely for reference and coordination with this part of Contract Documents.

3. Data contained in Documents prepared by Owner's separate consultants is believed to be reliable; however, Owner and Engineer do not guarantee their accuracy or completeness.

4. In preparing their Bids, Bidders shall consider and evaluate data contained in available project information as well as Contract Documents prepared by Engineer.

5. Related Sections – Section 40 05 52 Process Valves

Section 40 05 57 Actuators for Process Valves and Gates

Section 40 05 13 Common Work Results for Process Piping

Section 40 05 51 Common Work Results for Process Valves

C. Subsurface Investigation Report – NOT USED

D. Topographic Survey – NOT USED

E. Existing Conditions Survey – NOT USED

END OF SECTION

NOTE TO BIDDER: Use typewriter or ink for completing this Bid Form.

BID FORM (STIPULATED PRICE BASIS)

1.1 BIDDER

Bidder Name: _____

1.2 BID RECIPIENT

A. This Bid is submitted to:

Owner: City of Alcoa, TN
Attention: David Marcum
Address: 725 Universal Street, Alcoa, TN 37701
Project Identification: Raw Water Intake Pump Station Improvements 2025

1. 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.

B. BIDDER'S ACKNOWLEDGEMENTS

1. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

C. BIDDER'S REPRESENTATIONS

1. In submitting this Bid, Bidder represents that:

a. Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged.

Addendum No.	Addendum Date
_____	_____
_____	_____
_____	_____

(Bidder shall insert number of each Addendum received.)

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

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

d. Bidder has carefully studied: i) reports of explorations and tests of subsurface conditions at or contiguous to the Site and drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) which have been identified in Paragraph 5.03 of the Supplementary Conditions as containing reliable "technical data,"; and ii) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Paragraph 5.06 of the Supplementary Conditions as containing reliable "technical data."

e. Bidder has considered the information known to Bidder; 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 Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs.

f. Based on information and observations referred to in paragraph above, Bidder does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) Bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

g. 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.

h. Bidder has given Engineer written notice of conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.

i. The Bidding Documents are generally sufficient to indicate and convey understanding of terms and conditions for the performance of the Work for which this Bid is submitted.

D. BIDDER'S CERTIFICATION

1. Bidder Certifies:

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

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

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

d. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this paragraph:

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

2) "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 noncompetitive levels, or

3) (c) to deprive Owner of the benefits of free and open competition;

4) "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, noncompetitive levels; and

5) "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.

e. Required sales and use taxes are included in the stated Bid prices for the Work unless provision is made herein for the Bidder to separately itemize the estimated amount of sales tax or if Instructions to Bidders state Owner is tax exempt.

f. Neither Bidder nor their Subcontractors are on the Bureau of Labor and Industries list of persons having violated prevailing wage rate laws.

g. Bidder has not discriminated against minority, women, or emerging small business enterprises in obtaining required subcontracts.

h. Bidder is not in violation of any tax laws.

i. Bidder has established a drug-testing program for employees.

j. Subcontractors performing work will be registered before Subcontractor commences work.

E. BASIS OF BIDS

Bidder must submit a bid on all schedules, base bid, and bid alternates for bid to be accepted. Award will be based on grand total bid amount for Base Bid plus Bid Alternates. Individual bid alternates will not be awarded to separate bidders. The Owner reserves the right to remove any pay items, schedules and bid alternates from the work after bid is awarded.

1. Bidder shall complete the Work in accordance with the Contract Documents for the following price(s):

a. Lump Sum Base Bid Price:

PART 2

Base Bid Schedule			
Item	Description	Unit	Amount
1.	All Raw Water PS Improvements, Complete, Installed and Operational including all materials, installation and testing and startup.	LS	$
2	Allowance – (As Approved by Owner)	LS	$50,000
	Total Lump Sum Amount		$
In Words:			

1. Bid Summary:

   a. Bid Total = Base Bid Amount + Bid Alternate Amount:

      Summation of previous subtotals. $_____

      Total Written Out in Words: _____

      _____

B. TIME OF COMPLETION

1. Bidder agrees the Work, and any Milestones specified 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.

2. Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work, and any specified Milestones, within the Contract Times.

C. ATTACHMENTS TO THIS BID

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

   a. Required Bid security in the form of Bid Bond.

   b. Bidder's Experience: Successfully complete projects of similar size and complexity.

   c. Include project name, date of completion, and client contact information.

d. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids.

e. Contractor's License No.: _____

f. First-Tier Subcontractor Disclosure Form (required within 2 hours of Bid closing).

D. DEFINED TERMS

1. 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.

E. BID SUBMITTAL

1. This Bid submitted by: If Bidder is:

An Individual

Name (typed or printed): _____

By (signature): _____

Doing business as: _____

A Partnership

Partnership Name: _____ (SEAL)

By: _____
(Signature of general partner – attach evidence of authority to sign)

Name (typed or printed): _____

A Corporation

Corporation Name: _____ (SEAL)

State of Incorporation: _____

Type (General Business, Professional, Service, Limited Liability) __

By: _____
(Signature – attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____ (CORPORATE SEAL)

Attest: _____
(Signature of Corporate Secretary)

Date of Qualification to do business in (state where Project is located) is: _____
_____.

A Joint Venture

Joint Venturer Name: _____ (SEAL)

By: _____

(Signature of joint venture partner – attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

Bidder's Business Address: _____

Phone No.: _____ FAX No.: _____

E-mail: _____

SUBMITTED on _____, 20____

Tennessee Contractor's License No.: _____

Contractor's License Class (where applicable): _____

_____Yes _____No

END OF SECTION

BID BOND

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

BIDDER (Name and Address):

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

OWNER (Name and Address):

BID

Bid Due Date:
Project (Brief Description Including Location):

BOND

Bond Number:

Date (Not later than Bid due date):

Penal sum _____ _____
(Words) (Figures)

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

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

Note: Above addresses are to be used for giving required notice.

A. 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 Surety's liability.

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

C. This obligation shall be null and void if:

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

2. All Bids are rejected by Owner, or

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 by Bidder and within

5. 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

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

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

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

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

10. 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.

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

remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

12. The term “Bid” as used herein includes a Bid, offer, or proposal as applicable.

END OF SECTION

FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM

PROJECT NAME: _____

BID #:_____BID CLOSING: Date:_____Time:_____

This form shall be submitted at the location specified in the Advertisement/Invitation to Bid within 2 working hours after the advertised Bid closing time on advertised Bid closing date.

List below the name of each Subcontractor that will be furnishing labor or labor and materials and that is required to be disclosed, the category of work that Subcontractor will be performing, and dollar value of subcontract. Enter "NONE" if there are no Subcontractors that need to be disclosed. (Attach additional sheets if needed.)

NAME	DOLLAR VALUE	CATEGORY OF WORK
1)	$	
2)	$	
3)	$	
4)	$	
5)	$	
6)	$	
7)	$	
8)	$	

Failure to submit this form by the disclosure deadline will result in a nonresponsive Bid. A nonresponsive Bid will not be considered for award.

FORM SUBMITTED BY (BIDDER NAME):_____

CONTACT NAME:_____ PHONE NO.:_____

END OF SECTION

00 52 13 AGREEMENT
BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

THIS AGREEMENT is by and between _____ ("Owner") and _____ ("Contractor").

Owner and Contractor hereby agree as follows:

ARTICLE 1 – WORK

1.01 Contractor shall complete all Work as specified or indicated in these Contract Documents and drawings. The Work is generally described in the Summary of Work 01 10 00.

ARTICLE 2 – THE PROJECT

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

City of Alcoa-Raw Water Intake Pump Station Improvements 2025

ARTICLE 3 – ENGINEER

3.01 The part of the Project that pertains to the Work has been designed by Consor.

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

ARTICLE 4 – CONTRACT TIMES

4.01 *Time of the Essence*

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

4.02 *Contract Times: Days*

A. The Work will be substantially completed within 180 days after the Notice to Proceed. Substantially complete shall be defined when all of the equipment specified herein has been, constructed / installed / replaced, inspected, and approved for operation by the manufacturer and/or Owner and the Raw Water Intake may be operated without significant interruption for completion of any pending work. A punch list of remaining items shall be issued at the time of substantial completion identifying items to be completed to satisfy final completion.

B. The work shall be ready for final completion and final payment, with all punch list items satisfied no later than 30 calendar days after substantial completion.

C. Parts of the Work shall be substantially completed on or before the following Milestone(s):

1. Milestone 1 -Inspect intake pump station and river profile and obtain necessary field information for shop drawing submittals, 30 days from NTP.

2. Milestone 2 -Submit shop drawings for equipment review and approval, 45 days from NTP.

3. Milestone 3 – Replace equipment and place all parts and components of the intake pump station in service, 180 days from NTP.

4.03 *Liquidated Damages*

A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in 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 $1,000 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 4.02.A 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 $750 for each day that expires after such time until the Work is completed and ready for final payment.

3. Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive and will not be imposed concurrently.

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, a lump sum of: $_____.

*In Words:*_____

All specific cash allowances and alternate acceptance are included in the above price in accordance with Paragraph 13.02 of the General Conditions.

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 account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 10th 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 Work completed (with the balance being retainage); and

6.03 *Final Payment*

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

ARTICLE 7 – INTEREST

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

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

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

A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.

B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

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

D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

E. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor's safety precautions and programs.

F. 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.

G. 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.

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

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

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

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 *Contents*

A. The Contract Documents consist of the following:

1. This Agreement (pages 1 to ___, inclusive).
2. Performance bond (pages ___ to ___, inclusive).
3. Payment bond (pages ___ to ___, inclusive).
4. General Conditions (pages ___ to ___, inclusive).
5. Supplementary Conditions (pages ___ to ___, inclusive).
6. Specifications as listed in the table of contents of the Project Manual.
7. Drawings consisting of 9_ sheets with each sheet bearing the following general title: Raw Water Intake Pump Station Improvements 2025.
8. Addenda (numbers ___ to ___, inclusive).
9. Exhibits to this Agreement (enumerated as follows):
    a. Contractor's Bid (pages ___ to ___, inclusive).
10. 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 (pages __ to pages ____).
    b. Work Change Directives.
    c. Change Orders.

B. There are no Contract Documents other than those listed above in this Article 9.

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

ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

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

10.02 *Assignment of Contract*

A. Buyer has the right to assign this Contract for furnishing Goods and Special Services, but only to a person or entity with sufficient ability to satisfy all of Buyer's obligations under this Contract, and Seller hereby consents to such assignment. Forms documenting the assignment of the Contract, and consent of Seller's surety to the assignment, have been executed by Buyer, Seller, and Seller's surety, and are attached as exhibits to this Agreement.

1. The Contract will be executed in the name of Buyer initially and will be assigned to a construction contractor designated by Buyer. Such construction contractor's responsibilities will include the installation of the Goods. The assignment will occur on the effective date of the agreement between Buyer and the construction contractor, which is expected to occur on or about [_____]. As of the date of acceptance of assignment by the construction contractor, all references in the Contract Documents to Buyer shall mean the designated construction contractor.

2. The assignment of the Contract shall relieve the assignor from all further obligations and liabilities under this Contract. After assignment, Seller shall become a subcontractor or supplier to the assignee and, except as noted herein, all rights, duties, and obligations of Buyer under the Contract shall become the rights, duties, and obligations of the assignee.

3. After assignment:

a. All performance warranties, guarantees, and indemnifications required by the Contract Documents will continue to run for the benefit of assignor and, in addition, for the benefit of the assignee. However, if assignor and assignee make the same warranty or guarantee claim, then Seller shall only be liable once for such claim.

b. Except as provided in this Paragraph 11.02.A.3.b, all rights, duties, and obligations of Engineer to assignee and Seller under this Contract will cease.

1) Engineer will review Seller's Applications for Payment and make recommendations to assignee for payments as provided in Paragraphs 10.02 and 10.06 of the General Conditions.

2) Upon the written request of either the assignee or Seller, Engineer will issue with reasonable promptness clarifications or interpretations of the Contract Documents pursuant to the terms of Paragraph 9.02.A of the General Conditions.

B. No other assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound. Specifically, but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by Laws and Regulations). Unless specifically stated to the contrary in any written consent to such an assignment, such an assignment will

not release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 *Severability*

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

10.04 *Contractor's Certifications*

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

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

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

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

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

10.05 *Other Provisions*

A. Owner stipulates that if the General Conditions that are made a part of this Contract are based on EJCDC® C-700, Standard General Conditions for the Construction Contract, 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 or in the Supplementary Conditions.

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

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

OWNER:	CONTRACTOR:
_____	_____
By: _____	By: _____
Title: _____	Title: _____
	(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)
Attest: _____	Attest: _____
Title: _____	Title: _____
Address for giving notices:	Address for giving notices:
_____	_____
_____	_____
_____	_____
	License No.: _____ *(where applicable)*
(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)	*NOTE TO USER: Use in those states or other jurisdictions where applicable or required.*

END OF SECTION

STATE OF TENNESSEE

IRAN DIVESTMENT ACT CERTIFICATION

SUBJECT CONTRACT NUMBER(S):	
CONTRACTOR LEGAL ENTITY NAME:	
EDISON SUPPLIER IDENTIFICATION NUMBER:	

The Iran Divestment Act, Tenn. Code Ann. § 12-12-101 et. seq. requires a person that attempts to contract with the state, including a contract renewal or assumption, to certify at the time the bid is submitted or the contract is entered into, renewed, or assigned, that the person or the assignee is not identified on a list created pursuant to § 12-12-106.

Currently, the list is available online at the following website: https://www.tn.gov/generalservices/procurement/central-procurement-office--cpo-/library-/public-information-library.html

The Contractor, identified above, certifies by signature below that it is not included on the list of persons created pursuant to Tenn. Code Ann. § 12-12-106 of the Iran Divestment Act.

CONTRACTOR SIGNATURE

NOTICE: This certification MUST be signed by an individual with legal capacity to contractually bind the Contractor.

PRINTED NAME AND TITLE OF SIGNATORY

DATE

STATE OF TENNESSEE

NON-BOYCOTT OF ISRAEL CERTIFICATION

The Bidder certifies that it is not currently engaged in, and will not for the duration of the contract engage in, a boycott of Israel as defined by Tenn. Code Ann. § 12-4-119. This provision shall not apply to contracts with a total value of less than two hundred fifty thousand dollars ($250,000) or to contractors with less than ten (10) employees.

According to the law, a boycott of Israel means engaging in refusals to deal, terminating business activities, or other commercial actions that are intended to limit commercial relations with Israel, or companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel to do business, or persons or entities doing business in Israel, when such actions are taken:

1) In compliance with, or adherence to, calls for a boycott of Israel, or

2) In a manner that discriminates on the basis of nationality, national origin, religion, or other unreasonable basis, and is not based on a valid business reason. Tenn. Code Ann. § 12-4-119.

Signature of Authorized Representative	**Date**
Printed Name	**Phone Number / Email Address**

CITY OF ALCOA
Public Works & Engineering

The mission of the City of Alcoa's Development Services Department is to provide quality services that are responsive to customer needs. Customer satisfaction is achieved through economic responsibility by utilizing our human, financial and natural resources to their greatest potential. Our vision of a quality community will be built on foundations of the past while continuing to improve our services.

725 Universal Street, ALCOA, TN 37701 (865) 380-4800 FAX: (865) 380-4803

13 - DRUG-FREE WORKPLACE AFFIDAVIT OF PRIME BIDDER

STATE OF _____

COUNTY OF _____

Comes the affiant after having first been duly sworn and testifies as follows:

1. My name is _____. I hold the principal office of

_____ for _____
(Name of Principal Office) (Name of Bidding Entity)

2. _____ has submitted a bid to the City of Alcoa for the
(Name of Bidding Entity)

construction of the _____

PROJECT No. _____

3. _____ employs more than five (5) employees.
(Name of Bidding Entity)

4. In accordance with Tenn. Code Ann. §50-9-113, this is to certify that

_____ has in effect, at the time of submission of its bid to perform
(Name of Bidding Entity)

the construction of the City of Alcoa project identified above, a drug-free workplace program that complies with Title 50, Chapter 9 of the Tennessee Code.

5. This affidavit is made on personal knowledge.

Further the affiant saith not this _ day of _____, 20__.

_____

Title: _____

Subscribed and sworn to before me this _ day of _____, 20__.

_____

My Commission Expires: _____

NOTE: This affidavit to be attached to the Bid Form at the time of submission.

00 61 13.13 - PERFORMANCE BOND FORM

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

CONTRACTOR
(Name and Address):

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

OWNER (Name and Address):

CONTRACT

Date:
Amount:
Description (Name and Location):

BOND

Bond Number:
Date (Not earlier than Contract Date):
Amount:
Modifications to this Bond Form:

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

CONTRACTOR AS PRINCIPAL

Company:
Signature:_____(Seal)
Name and Title

SURETY

_____(Seal)
Surety's Name and Corporate Seal

By: _____
Signature and Title

(Attach Power of Attorney)

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

Attest: _____
Signature and Title

CONTRACTOR AS PRINCIPAL

Company:

Signature:_____(Seal)

Name and Title

SURETY

_____(Seal)

Surety's Name and Corporate Seal

By: _____

Signature and Title

(Attach Power of Attorney)

Attest: _____

Signature and Title

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

B. If Contractor performs the Contract, Surety and Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph C.1.

C. If there is no Owner Default, Surety's obligation under this Bond shall arise after:

1. Owner has notified Contractor and Surety, at the addresses described in Paragraph J below, that Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with Contractor and Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If Owner, Contractor and Surety agree, Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive Owner's right, if any, subsequently to declare a Contractor Default; and

2. Owner has declared a Contractor Default and formally terminated Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than 20 days after Contractor and Surety have received notice as provided in Paragraph C.1; and

3. Owner has agreed to pay the Balance of the Contract Price to:

   a. Surety in accordance with the terms of the Contract;

   b. Another contractor selected pursuant to Paragraph D.3 to perform the Contract.

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

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

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

3. Obtain bids or negotiated proposals from qualified contractors acceptable to Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Owner and Contractor selected with Owner's concurrence, to

be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to Owner the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by Owner resulting from Contractor Default; or

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

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

    b. Deny liability in whole or in part and notify Owner citing reasons therefor.

E. If Surety does not proceed as provided in Paragraph D with reasonable promptness, Surety shall be deemed to be in default on this Bond 15 days after receipt of an additional written notice from Owner to Surety demanding that Surety perform its obligations under this Bond, and Owner shall be entitled to enforce any remedy available to Owner. If Surety proceeds as provided in Paragraph D.4, and Owner refuses the payment tendered or Surety has denied liability, in whole or in part, without further notice Owner shall be entitled to enforce any remedy available to Owner.

F. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph D.1, D.2, or D.3 above, then the responsibilities of Surety to Owner shall not be greater than those of Contractor under the Contract, and the responsibilities of Owner to Surety shall not be greater than those of Owner under the Contract. To a limit of the amount of this Bond, but subject to commitment by Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:

1. The responsibilities of Contractor for correction of defective Work and completion of the Contract;

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

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

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

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

I. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located and shall be instituted within two years after Contractor Default or within two years after Contractor ceased working or within two years after 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 period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

J. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the address shown on the signature page.

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

L. Definitions.

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

2. Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.

3. Contractor Default: Failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.

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

FOR INFORMATION ONLY – Name, Address and Telephone Surety Agency or Broker Owner's Representative (engineer or other party)

END OF SECTION

00 61 13.16 - PAYMENT BOND FORM

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

CONTRACTOR
(Name and Address):

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

OWNER (Name and Address):

CONTRACT

Date:
Amount:
Description (Name and Location):

BOND

Bond Number:
Date (Not earlier than Contract Date):
Amount:
Modifications to this Bond Form:

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

CONTRACTOR AS PRINCIPAL

Company:
Signature:_____(Seal)
Name and Title

SURETY

_____(Seal)
Surety's Name and Corporate Seal

By: _____
Signature and Title

(Attach Power of Attorney)

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

Attest: _____
Signature and Title

CONTRACTOR AS PRINCIPAL

Company:

Signature:_____(Seal)

Name and Title

SURETY

_____(Seal)

Surety's Name and Corporate Seal

By: _____

Signature and Title

(Attach Power of Attorney)

Attest: _____

Signature and Title

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

B. With respect to Owner, this obligation shall be null and void if Contractor:

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

2. Defends, indemnifies, and holds harmless Owner from all claims, demands, liens, or suits alleging non-payment by Contractor by any person or entity who furnished labor, materials, or equipment for use in the performance of the Contract, provided Owner has promptly notified Contractor and Surety (at the addresses described in Paragraph L) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens, or suits to Contractor and Surety, and provided there is no Owner Default.

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

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

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

2. Claimants who do not have a direct contract with Contractor:

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

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

c. Not having been paid within the above 30 days, have sent a written notice to Surety and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to Contractor.

E. If a notice by a Claimant required by Paragraph D is provided by Owner to Contractor or to Surety, that is sufficient compliance.

F. Reserved.

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

H. Amounts owed by Owner to Contractor under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any performance bond. By Contractor furnishing and Owner accepting this Bond, they agree that all funds earned by Contractor in the performance of the Contract are dedicated to satisfy obligations of Contractor and Surety under this Bond, subject to Owner's priority to use the funds for the completion of the Work.

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

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

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

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

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

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

O. Definitions:

1. Claimant: An individual or entity having a direct contract with Contractor, or with a first-tier subcontractor of Contractor, to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of Contractor and 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.

2. Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.

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

FOR INFORMATION ONLY – Name, Address and Telephone Surety Agency or Broker: Owner's Representative (engineer or other party):

END OF SECTION

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

Issued and Published Jointly by

These General Conditions have been prepared for use with the Agreement Between Owner and Contractor for Construction Contract (EJCDC® C-520, Stipulated Sum, or C-525, Cost-Plus, 2013 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other.

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 Defined Terms

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

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

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

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

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

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

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

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

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

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

10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer has declined to address. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. ("CERCLA"); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5501 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. ("RCRA"); (d) the Toxic Substances Control Act, 15 U.S.C.

§§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing

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

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

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

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

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

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

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

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

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

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

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

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

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

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

available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.

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

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

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

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

1.02 Terminology

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

B. Intent of Certain Terms or Adjectives:

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

C. Day:

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

D. Defective:

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

a. does not conform to the Contract Documents; or

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

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

E. Furnish, Install, Perform, Provide:

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

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

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

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

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

ARTICLE 2 – PRELIMINARY MATTERS

2.01 Delivery of Bonds and Evidence of Insurance

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

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

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

2.02 Copies of Documents

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

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

2.03 Before Starting Construction

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

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

2. a preliminary Schedule of Submittals; and

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

2.04 Preconstruction Conference; Designation of Authorized Representatives

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph

2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.

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

2.05 Initial Acceptance of Schedules

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

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

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

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

2.06 Electronic Transmittals

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

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

C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 Intent

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

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

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

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

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

3.02 Reference Standards

A. Standards Specifications, Codes, Laws and Regulations

1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard specification, manual, reference

standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

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

3.03 Reporting and Resolving Discrepancies

A. Reporting Discrepancies:

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

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

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

B. Resolving Discrepancies:

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

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

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

3.04 Requirements of the Contract Documents

A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under

the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.

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

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

3.05 Reuse of Documents

A. Contractor and its Subcontractors and Suppliers shall not:

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

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

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

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 Commencement of Contract Times; Notice to Proceed

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

4.02 Starting the Work

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

4.03 Reference Points

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

4.04 Progress Schedule

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

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

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

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

4.05 Delays in Contractor's Progress

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

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

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

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

2. abnormal weather conditions;

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

4. acts of war or terrorism.

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

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

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

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

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

5.01 Availability of Lands

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

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

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

5.02 Use of Site and Other Areas

A. Limitation on Use of Site and Other Areas:

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

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

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

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

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

5.03 Subsurface and Physical Conditions

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

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

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

3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions

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

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 Differing Subsurface or Physical Conditions

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

1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or
2. is of such a nature as to require a change in the Drawings or Specifications; or
3. differs materially from that shown or indicated in the Contract Documents; or
4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

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

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

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

D. Possible Price and Times Adjustments:

1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
    a. such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
    b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will

be subject to the provisions of Paragraph 13.03; and,

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

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

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

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

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

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

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

5.05 Underground Facilities

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

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

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

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

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

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

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

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

C. *Engineer's Review*: Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to

which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

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

E. Possible Price and Times Adjustments:

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

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

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

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

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

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

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

5.06 Hazardous Environmental Conditions at Site

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

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

2. Technical Data contained in such reports and drawings.

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

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

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

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

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

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

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

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

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

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

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

J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and

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

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

ARTICLE 6 – BONDS AND INSURANCE

6.01 Performance, Payment, and Other Bonds

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

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

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

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

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

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

6.02 Insurance—General Provisions

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

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

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

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

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

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

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

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

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

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

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

6.03 Contractor's Insurance

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

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).
3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).
4. Foreign voluntary worker compensation (if applicable).

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

1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
2. claims for damages insured by reasonably available personal injury liability coverage.
3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.

C. *Commercial General Liability—Form and Content*: Contractor's commercial liability policy shall be written on a 1996 (or later) ISO

commercial general liability form (occurrence form) and include the following coverages and endorsements:

1. Products and completed operations coverage:
    a. Such insurance shall be maintained for three years after final payment.
    b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
3. Broad form property damage coverage.
4. Severability of interest.
5. Underground, explosion, and collapse coverage.
6. Personal injury coverage.
7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.

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

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

F. *Contractor's pollution liability insurance*: Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.

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

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

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

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

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

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

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

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

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

6.04 Owner's Liability Insurance

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

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

6.05 Property Insurance

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

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

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

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

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

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

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

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

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

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

10. not include a co-insurance clause.

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

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

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

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

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

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

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

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

6.06 Waiver of Rights

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

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

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

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

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

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

6.07 Receipt and Application of Property Insurance Proceeds

A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

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

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

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 Supervision and Superintendence

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

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

7.02 Labor; Working Hours

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

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

7.03 Services, Materials, and Equipment

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

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

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

7.04 "Or Equals"

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

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

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

      1) it is at least equal in materials of construction, quality, durability, appearance,

strength, and design characteristics;

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

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

4) it is not objectionable to Owner.

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

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

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

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

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

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

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

7.05 Substitutes

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

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

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

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

a. shall certify that the proposed substitute item will:

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

2) be similar in substance to that specified, and

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

b. will state:

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

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

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

c. will identify:

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

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

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

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

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

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

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

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

7.06 Concerning Subcontractors, Suppliers, and Others

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

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

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

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

acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.

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

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

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

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

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

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

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

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

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

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

O. Nothing in the Contract Documents:

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

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

7.07 Patent Fees and Royalties

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

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

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

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

7.08 Permits

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

7.09 Taxes

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

7.10 Laws and Regulations

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

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

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

such notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 Record Documents

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

7.12 Safety and Protection

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

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

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

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

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

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

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

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

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

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

7.13 Safety Representative

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

7.14 Hazard Communication Programs

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

7.15 Emergencies

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

7.16 Shop Drawings, Samples, and Other Submittals

A. Shop Drawing and Sample Submittal Requirements:

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

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

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

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

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

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

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

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

1. Shop Drawings:

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

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

2. Samples:

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

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

intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.

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

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

D. Engineer's Review:

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

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

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

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

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

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

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

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

E. Resubmittal Procedures:

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

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

3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to

Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 Contractor's General Warranty and Guarantee

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

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

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

2. normal wear and tear under normal usage.

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

1. observations by Engineer;

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

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

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

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

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

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

8. any correction of defective Work by Owner.

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

7.18 Indemnification

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

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

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

agents, consultants and subcontractors arising out of:

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

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

7.19 Delegation of Professional Design Services

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

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

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

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

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

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 Other Work

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

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

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

D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other

work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

8.02 Coordination

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

1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
2. an itemization of the specific matters to be covered by such authority and responsibility; and
3. the extent of such authority and responsibilities.

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

8.03 Legal Relationships

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

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

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

D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors,

members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 Communications to Contractor

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

9.02 Replacement of Engineer

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

9.03 Furnish Data

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

9.04 Pay When Due

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

9.05 Lands and Easements; Reports, Tests, and Drawings

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

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

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

9.06 Insurance

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

9.07 Change Orders

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

9.08 Inspections, Tests, and Approvals

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

9.09 Limitations on Owner's Responsibilities

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

9.10 Undisclosed Hazardous Environmental Condition

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

9.11 Evidence of Financial Arrangements

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

9.12 Safety Programs

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

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

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

10.01 Owner's Representative

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

10.02 Visits to Site

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

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 Project Representative

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

10.04 Rejecting Defective Work

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

10.05 Shop Drawings, Change Orders and Payments

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

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

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

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

10.06 Determinations for Unit Price Work

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

10.07 Decisions on Requirements of Contract Documents and Acceptability of Work

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

10.08 Limitations on Engineer's Authority and Responsibilities

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

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

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

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

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

10.09 Compliance with Safety Program

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

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 Amending and Supplementing Contract Documents

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

1. Change Orders:

a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.

b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.

2. *Work Change Directives*: A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

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

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

11.02 Owner-Authorized Changes in the Work

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

11.03 Unauthorized Changes in the Work

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

11.04 Change of Contract Price

A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.

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

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

2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).

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

1. a mutually acceptable fixed fee; or

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

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

   b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;

   c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.01.C.2.a and 11.01.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of five percent of the amount (fee

plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;

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

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 Change of Contract Times

A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.

B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 Change Proposals

A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.

1. *Procedures*: Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.

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

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

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

11.07 Execution of Change Orders

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

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

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

3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and

4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.

B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 Notification to Surety

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

ARTICLE 12 – CLAIMS

12.01 Claims

A. *Claims Process*: The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:

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

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

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

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

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

D. Mediation:

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

2. If Owner and Contractor agree to mediation, then after 60 days from such

agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.

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

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

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

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

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

13.01 Cost of the Work

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

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

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

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

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

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case

the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

    a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

    b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

    c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

    d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.

    e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

    f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

    g. The cost of utilities, fuel, and sanitary facilities at the Site.

    h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.

    i. The costs of premiums for all bonds and insurance that

Contractor is required by the Contract Documents to purchase and maintain.

C. *Costs Excluded*: The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*: When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.

E. *Documentation*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

13.02 Allowances

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances*: Contractor agrees that:

1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

13.03 Unit Price Work

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of the following paragraph.

E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;

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

3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

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

14.01 Access to Work

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

14.02 Tests, Inspections, and Approvals

A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.

B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:

1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;

2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;

3. by manufacturers of equipment furnished under the Contract Documents;

4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and

5. for acceptance of materials, mix designs, or equipment submitted for approval

prior to Contractor's purchase thereof for incorporation in the Work.

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

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

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

14.03 Defective Work

A. *Contractor's Obligation*: It is Contractor's obligation to assure that the Work is not defective.

B. *Engineer's Authority*: Engineer has the authority to determine whether Work is defective, and to reject defective Work.

C. *Notice of Defects*: Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.

D. *Correction, or Removal and Replacement*: Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.

E. *Preservation of Warranties*: When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

F. *Costs and Damages*: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 Acceptance of Defective Work

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

14.05 Uncovering Work

A. Engineer has the authority to require special inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.

C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose,

or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.

1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.

2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 Owner May Stop the Work

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

14.07 Owner May Correct Defective Work

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.

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

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

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

15.01 Progress Payments

A. *Basis for Progress Payments*: The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.

B. Applications for Payments:

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. Review of Applications:

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

   a. the Work has progressed to the point indicated;

   b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and

   c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

   a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or

   b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

   a. to supervise, direct, or control the Work, or

b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or

e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.

6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:

a. the Work is defective, requiring correction or replacement;

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

c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

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

D. Payment Becomes Due:

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

E. Reductions in Payment by Owner:

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:

a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;

c. Contractor has failed to provide and maintain required bonds or insurance;

d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;

e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

f. the Work is defective, requiring correction or replacement;

g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

h. the Contract Price has been reduced by Change Orders;

i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;

j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;

k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

l. there are other items entitling Owner to a set off against the amount recommended.

2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

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

15.02 Contractor's Warranty of Title

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

15.03 Substantial Completion

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which shall fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a

permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

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

15.04 Partial Use or Occupancy

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.

2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.05 regarding builder's risk or other property insurance.

15.05 Final Inspection

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

15.06 Final Payment

A. Application for Payment:

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

a. all documentation called for in the Contract Documents;

b. consent of the surety, if any, to final payment;

c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

d. a list of all disputes that Contractor believes are unsettled; and

e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. Engineer's Review of Application and Acceptance:

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Completion of Work*: The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.

D. *Payment Becomes Due*: Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 Waiver of Claims

A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.

B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.08 Correction Period

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the

Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. correct the defective repairs to the Site or such other adjacent areas;
2. correct such defective Work;
3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 Owner May Suspend Work

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

16.02 Owner May Terminate for Cause

A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);
2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
4. Contractor's repeated disregard of the authority of Owner or Engineer.

B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:

1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and

2. enforce the rights available to Owner under any applicable performance bond.

C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.

D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.

G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 Owner May Terminate For Convenience

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and

3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.

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

16.04 Contractor May Stop Work or Terminate

A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such

amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

17.01 Methods and Procedures

A. *Disputes Subject to Final Resolution*: The following disputed matters are subject to final resolution under the provisions of this Article:

1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and
2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.

B. *Final Resolution of Disputes*: For any dispute subject to resolution under this Article, Owner or Contractor may:

1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or
2. agree with the other party to submit the dispute to another dispute resolution process; or
3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 Giving Notice

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or
2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

18.02 Computation of Times

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

18.03 Cumulative Remedies

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 Limitation of Damages

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

18.05 No Waiver

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

18.06 Survival of Obligations

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

termination or completion of the Contract or termination of the services of Contractor.

18.07 Controlling Law

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

18.08 Headings

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

00 73 00 - SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract as indicated below. All provisions that are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof. The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

SC-1.01. Renumber Paragraph 1.01.A.38 to 1.01.A.38.a, and add the following paragraph:

> 1.01.A.38.b.*Specialist*—The term Specialist refers to a person, partnership, firm, or corporation of established reputation (or if newly organized, whose personnel have previously established a reputation in the same field), which is regularly engaged in, and which maintains a regular force of workers skilled in either (as applicable) manufacturing or fabricating items required by the Contract Documents, or otherwise performing Work required by the Contract Documents. Where the Specifications require the installation by a Specialist, that term shall also be deemed to mean either the manufacturer of the item, a person, partnership, firm, or corporation licensed by the manufacturer, or a person, partnership, firm, or corporation who will perform the Work under the manufacturer's direct supervision.

SC-1.01. Add the following language at the end of Paragraph 1.01.A.40:

> Substantial Completion is further defined as (i) that degree of completion of the Project's operating facilities or systems sufficient to provide Owner the full time, uninterrupted, and continuous beneficial operation of the Work; and (ii) required functional, performance and acceptance, or startup testing has been successfully demonstrated for components, devices, equipment, and instrumentation and control to the satisfaction of Engineer in accordance with the requirements of the Specifications.(iii) completed all surface restorations to specified conditions which are approved by Owner and Engineer.

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

> 2.01.B. Evidence of Contractor's Insurance: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner copies of the policies of insurance (including all endorsements, and identification of applicable self-insured retentions and deductibles) required to be provided by Contractor in Article 6. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
>
> 2.01.C. Evidence of Owner's Insurance: After receipt from Contractor of the executed 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 under Article 6 (if any). Owner may block out

(redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

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

Owner will furnish to Contractor four hard copies of Contract Documents (including fully executed counterpart of the Agreement).

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

2.02.A. Owner shall furnish to Contractor one 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 executed counterpart of the Agreement) in electronic portable document format (PDF).

SC-3.01. Delete Paragraph 3.01.C in its entirety.

SC-3.01. Add the following new paragraph immediately after Paragraph 3.01.E:

3.01.F. Sections of Division 01, General Requirements, govern the execution of the Work of all sections of the Specifications.

SC-5.03. Delete Paragraphs 5.03.A and 5.03.B in their entirety and insert the following in their place:

5.03.A. No reports of explorations or tests of subsurface conditions at or contiguous to the Site, or drawings of physical conditions relating to existing surface or subsurface structures at the Site are known to Owner.

5.04.E Possible Price and Times Adjustments:

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

5.04.E.1.a. such condition must fall within any one or more of the categories described in Paragraph SC-5.04.A;

5.04.E.1.b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03 of the General Conditions; and,

5.04.E.1.c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

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

5.04.E.2.a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise; or

5.04.E.2.b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or

5.04.E.2.c. Contractor failed to give the written notice as required by Paragraph SC 5.04.A.

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

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

SC-5.06. Delete Paragraph 5.06.A and Paragraph 5.06.B in their entirety and insert the following in their place:

5.06.A. No reports or drawings related to Hazardous Environmental Conditions are known to Owner.

SC-6.01. Add the following language after Paragraph 6.01.A: Provide the following additional bond:

6.01.A.1 Contractor's Public Works Bond:

5.04.E.4.a. Public works bond shall be in the amount of $30,000.

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

6.02.A.1. Surety and insurance companies from which the bonds and insurance for this Project are purchased shall have an A.M. Best's rating of no less than VII in addition to other requirements specified herein.

SC-6.03. Add the following new paragraph immediately following Paragraph 6.03.A.4:

6.03.A.5 The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

6.03.A.5.a Workers' Compensation and related coverages under Paragraph 6.03.A.1 and Paragraph 6.03.A.3 of the General Conditions:

6.03.A.5.1 State: Statutory.

6.03.A.5.a.5 Employer's Liability:

Bodily Injury, Each Accident: $1,000,000

Bodily Injury by Disease, Each Employee: $1,000,000

Bodily Injury/Disease Aggregate: $1,000,000

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

6.03.C Workers Compensation:

I6.03.C.1 Contractor shall promptly, as due, make payment to any entity furnishing care incident to sickness or injury, to employees of Contractor, of all sums which Contractor agrees to pay for such care and all moneys which Contractor deducted from the wages of employees pursuant to any law, contract, or agreement for the purpose of providing or paying for such service.

6.03.C.2 Contractor and Subcontractors that employ workers who work under this Contract in the State of Tennessee and provide required Workers' Compensation coverage, unless such employers are exempt. Contractor shall ensure that each of its Subcontractors complies with these requirements.

SC-6.03. Add the following new paragraph immediately following Paragraph 6.03.C.8:

6.03.C.9 Contractor's General Liability under Paragraph 6.03.B. and Paragraph 6.03.C of the General Conditions which shall eliminate the exclusion with respect to property under the care, custody and control of Contractor:

6.03.C.9.a	General Aggregate	$2,000,000
6.03.C.9.b	Products—Completed Operations	$1,000,000
6.03.C.9.c	Personal and Advertising Injury (per person/Organization)	$1,000,000

6.03.C.9.e. Property Damage liability insurance will provide Explosion, Collapse, and Underground coverages where applicable.

SC-6.03. Add the following new paragraph immediately following Paragraph 6.03.D:

6.03.D.1. Contractor's Automobile Liability 6.03.D.1.a. Bodily Injury:

Each Person	$1,000,000
Each Accident	$1,000,000
6.03.D.1.b. Property Damage:	
Each Accident	$1,000,000

SC-6.03. Add the following new paragraph immediately following Paragraph 6.03.E:

6.03.E.1. Excess or Umbrella Liability:

a)	General Aggregate	$5,000,000
b)	Each Occurrence	$5,000,000

SC-6.03. Add the following language after Paragraph 6.03.G:

6.03.G.1. Include the following parties or entities as additional insured:

6.03.G.1.a. City of Alcoa, 725 Universal Street, Alcoa, TN 37701

6.03.G.1.b. Consor North America Inc., 1111 N. Northshore Dr, Suite S302, Knoxville, TN 37919

SC-6.05. Add the following language as Paragraph 6.05.A.15:

6.05.A.15. Property insurance furnished under this Contract shall have deductibles no greater than $5,000 for direct physical loss in any one occurrence for sub-limits except for earthquake, which shall have a maximum deductible of $100,000.

SC-7.02. Add the following language at the end of Paragraph 7.02.B:

No person shall be employed for more than 10 hours in any 1 day, or 40 hours in any 1 week, except in cases of necessity, emergency, or where the public policy absolutely requires it. In such cases, the person so employed shall be paid at least time and a half the person's regular rate of pay for all time worked in excess of 40 hours in one week; when work week is 8 hours for 5 consecutive days or 10 hours for 4 consecutive days, and for time worked on Saturday and on any legal holiday.

SC-7.02. Add the following language to the end of Paragraph 7.02.B:

7.02.B.1. Contractor and Subcontractor regular working hours consist of up to 10 working hours within an 11-hour period between 7:00 a.m. and 6:00 p.m., on a regularly scheduled basis, excluding Sundays and holidays. Overtime work is work in excess of 40 hours per week.

SC-7.06. Add the following language at the end of Paragraph 7.06.A:

Contractor shall perform a minimum of 25 percent of the onsite labor with its own employees.

SC-7.10. Add the following new paragraph(s) immediately after Paragraph 7.10.C:

7.10.D. While not intended to be inclusive of all Laws or Regulations for which Contractor may be responsible under Paragraph 7.10, the following Laws or Regulations are included as mandated by statute or for the convenience of Contractor:

7.10.D.1. Prevailing Wage Rates: N/A

7.10.D.2. Contractor will not discriminate against minority, women, or emerging small business in obtaining required subcontracts.

7.10.D.3. Contractor shall demonstrate that an employee drug testing program is in place.

7.10.D.6. Contractor shall salvage or recycle construction and demolition debris if feasible and cost effective.

7.10.D.7. Workers employed by Contractor shall not be able to collect for unpaid overtime unless a claim is filed.

7.10.D.8. Person claiming not being paid in full for supplied labor or materials for performance of the Work has right to file notice of such claim.

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

10.03.B. Resident Project Representative (RPR) will be furnished by Owner. The responsibilities, authority, and limitations of the RPR are limited to those of Owner in accordance with Paragraph 10.08 and as set forth elsewhere in the Contract Documents and are further limited and described below.

10.03.C. Responsibilities and Authority:

10.03.C.1. Schedules: Review and monitor Progress Schedule, Schedule of Submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.

10.03.C.2. Conferences and Meetings: Conduct or attend meetings with Contractor, such as preconstruction conferences, progress meetings, Work conferences and other Project related meetings.

10.03.C.3. Liaison: (i) Serve as Engineer's liaison with Contractor, working principally through Contractor's authorized representative, and assist in understanding the intent of the Contract Documents; (ii) assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's onsite operations; (iii) assist in obtaining from Owner additional details or information when required for proper execution of the Work.

10.03.C.4. Interpretation of Contract Documents: Inform Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.

10.03.C.5. Submittals: Receive submittals that are furnished at the Site by Contractor and notify Engineer of availability for examination. Advise Engineer and Contractor of the commencement of any Work or arrival of materials and equipment at Site, when recognized, requiring a Shop Drawing or Sample if the submittal has not been approved by

Engineer.

10.03.C.6. Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and provide recommendations to Engineer; transmit to Contractor, in writing decisions as issued by Engineer.

10.03.C.7. Review of Work and Rejection of Defective Work: (i) Conduct onsite observations of the Work in progress to assist Engineer in determining if the Work is, in general, proceeding in accordance with the Contract Documents; (ii) inform Engineer and Contractor whenever RPR believes that any Work is defective; (iii) advise Engineer whenever RPR believes that any Work will not produce a completed Project that conforms generally to the Contract Documents or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged or does not meet the requirements of any inspection test, or approval required to be made; and advise Engineer of that part of the Work in progress that RPR believes should be corrected or rejected or uncovered for observation, or requires special testing, inspection, or approval.

10.03.C.8. Inspections, Tests, and System Startups: (i) Verify tests, equipment and systems startups and operating and maintenance training are conducted in the presence of appropriate personnel, and that Contractor maintains adequate records thereof; (ii) observe, record, and report to Engineer appropriate details relative to the test procedures and system startups; and (iii) accompany visiting inspectors representing public or other agencies having jurisdiction over the Project, record the results of these inspections, and report to Engineer.

10.03.C.9. Records: (i) Maintain records for use in preparing Project documentation; (ii) keep a diary or log book recording pertinent Site conditions, activities, decisions and events; (iii) record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of Contractors, Subcontractors, and major Suppliers of materials and equipment.

10.03.C.10. Reports: (i) Furnish Engineer periodic reports of progress of the Work and of Contractor's compliance with the Progress Schedule and Schedule of Submittals; (ii) immediately notify Engineer of the occurrence of Site accidents, emergencies, acts of God endangering the Work, damage to property by fire or other causes, or the discovery of any Hazardous Environmental Condition; and (iii) assist Engineer in drafting proposed Change Orders, Work Change Directives, and Field Orders; obtain backup material from Contractor as appropriate.

10.03.C.11. Payment Requests: Review Applications for Payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting

particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

10.03.C.12. Certificates, Operation and Maintenance Manuals: During the course of the Work, verify materials and equipment certificates and operation and maintenance manuals and other data required by Specifications to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents been delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

10.03.C.13. Completion: (i) Participate in a Substantial Completion inspection; assist in determination of Substantial Completion and the preparation of lists of items to be completed or corrected; (ii) Participate in a final inspection in the company of Engineer, Owner, and Contractor and prepare a final list of items to be completed and deficiencies to be remedied; and (iii) observe whether items on final list have been completed or corrected, and make recommendations to Engineer concerning acceptance.

10.03.D. Limitations of Authority: Resident Project Representative will not:

10.03.D.1. have authority to authorize a deviation from Contract Documents or substitution of materials or equipment, unless authorized by Engineer; or

10.03.D.2. exceed the limitations of Engineer's authority as set forth in Contract Documents; or

10.03.D.3. undertake any of the responsibilities of Contractor, Subcontractors, Suppliers, or Contractor's authorized representative; or

10.03.D.4. advise on, issue directions relative to, or assume control over an aspect of the means, methods, techniques, sequences, or procedures of Contractor's work unless such advice or directions are specifically required by the Contract Documents; or

10.03.D.5. advise on, issue directions regarding, or assume control over safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor; or

10.03.D.6. participate in specialized field or laboratory tests or inspections conducted offsite by others, except as specifically authorized by Engineer; or

10.03.D.7. accept Shop Drawings or Samples from anyone other than Contractor; or

10.03.D.8. authorize Owner to occupy the Project in whole or in part.

SC-13.01. Delete Paragraph 13.01.B.5.c in its entirety and insert the following in its place:

13.01.B.5.c. Construction Equipment and Machinery:

13.01.B.5.c.(1) Rentals of construction equipment and machinery, and the parts thereof in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. Such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

13.01.B.5.c.(2) Costs for equipment and machinery owned by Contractor will be paid at a rate shown for such equipment in the Rental Rate Blue Book published by Equipment Watch. An hourly rate will be computed by dividing the monthly rates by

176. These computed rates will include all operating costs. Costs will include the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of such equipment or machinery, or parts thereof, shall cease to accrue when the use thereof is no longer necessary for the changed Work. Equipment or machinery with a value of less than $1,000 will be considered small tools.

SC-13.01. Add the following language to the end of Paragraph 13.01.B.5.h:

Express and courier services must be approved prior to use.

SC-14.02. Delete Paragraph 14.02.B in its entirety and insert the following in its place:

14.02.B. Contractor shall retain an independent testing laboratory or testing agency and shall be responsible for arranging and shall pay for specified tests, inspections, and approvals required for Owner's and Engineer's acceptance of the Work at the Site except:

14.02.B.1. costs incurred in connection with tests or inspections pursuant to Paragraph 14.02.C shall be paid for as provided in said paragraph; and

14.02.B.2. as otherwise specifically provided in the Contract

Documents. SC-14.02. Add the following language at the end of Paragraph

14.02.D:

Tests required by Contract Documents to be performed by Contractor that require test certificates be submitted to Owner or Engineer for acceptance shall be made by an independent testing laboratory or agency licensed or certified in accordance with Laws and Regulations and applicable state and local statutes. In the event state license or certification is not required, testing laboratories or agencies shall meet the following applicable requirements:

14.02.D.6. Basic requirements of ASTM E329, "Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection" as applicable.

14.02.D.7. Calibrate testing equipment at reasonable intervals by devices of accuracy, traceable to the National Institute of Standards and Technology or accepted values of natural physical constants.

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

15.01.D.1. Thirty days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 15.01.E.) become due and when due will be paid by Owner to Contractor.

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

SC 15.03.B.1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, shall be paid by Contractor to Owner. If Contractor does not pay, or the

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

SC-14.07.A.2. Add the following new paragraph immediately after Paragraph 14.07.A.2:

14.07.A.2.e. When out-of-state Contractor is awarded a Contract, Contractor is required to report to the Department of Revenue the Contract Price, terms of payment, length of Contract, and other information as Department of Revenue may require. Owner will verify Contractor has satisfied this requirement prior to issuing final payment.

SC-14.02. Add the following new paragraphs immediately after Paragraph 15.01.E:

15.01.F. Subcontractor Payments:

15.01.F.1. Contractor shall: (i) make payment promptly, as due to all persons supplying to Contractor, labor or material for the prosecution of the Work under these Contract Documents,

(ii) pay all contributions or amounts due the Industrial Accident Fund from Contractor or Subcontractor incurred in the performance of the Work, (iii) not permit any lien or Claim to be filed or prosecuted against

Owner, on account of labor or material furnished, and (iv) pay to the Department of Revenue all sums withheld from employees.

15.01.F.2.

15.01.F.2.a. If Contractor fails, neglects, or refuses to make prompt payment to Subcontractors or Suppliers of any Claim as such Claim becomes due, Owner may pay such Claim and charge the amount of the payment against funds due Contractor. The payment of a Claim in the manner authorized shall not relieve Contractor or Contractor's surety from obligation with respect to any unpaid Claims.

15.01.F.2.b. If Contractor or first-tier Subcontractor fails, neglects, or refuses to make payments within 30 days after receipt of payment from Owner, Contractor or first-tier Subcontractor shall owe amount due plus interest charges commencing at the end of the 10-day period that payment is due and ending upon payment.

15.01.F.2.c. If Contractor or first-tier Subcontractor fails, neglects, or refuses to make payments to person furnishing labor or materials, person may file a complaint with the Construction Contractors Board.

15.01.F.3.

15.01.F.3.a. Contractor shall include in each subcontract for property or services entered in to by Contractor or first-tier Subcontractor, including material Suppliers, for the purpose of performing Work under this Contract, a clause that obligates Contractor to pay first-tier Subcontractor for satisfactory performance under its subcontract within 10 days out of such amounts as are paid to Contractor by Owner.

15.01.F.3.b. Contractor shall include in each subcontract a clause that obligates Contractor to pay first-tier Subcontractor an interest penalty of three times the discount rate on 90-day commercial paper in effect on the date that is 30 days after the date when payment was received from Owner, but the rate of interest shall not exceed
30 percent. The amount of interest may not be waived.

15.01.F.3.c. Contractor shall require first-tier Subcontractors to included same clauses in subcontracts with lower tiered Subcontractors and Suppliers in connection with this Project.

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

17.01: SC-17.02 Arbitration:

SC-17.02.A. All matters subject to final resolution under this Article will be decided by arbitration in accordance with the rules of American

Arbitration Association, subject to the conditions and limitations of this paragraph. This agreement to arbitrate and any other agreement or consent to arbitrate entered into will be specifically enforceable under the prevailing law of any court having jurisdiction.

SC-17.02.B. The demand for arbitration will be filed in writing with the other party to the Contract and with the selected arbitrator or arbitration provider, and a copy will be sent to Engineer for information. The demand for arbitration will be made within the specific time required in this Article, or if no specified time is applicable within a reasonable time after the matter in question has arisen, and in no event shall any such demand be made after the date when institution of legal or equitable proceedings based on such matter in question would be barred by the applicable statute of limitations. The demand for arbitration should include specific reference to Paragraph SC-17.02.D below.

SC-17.02.C. No arbitration arising out of or relating to the Contract shall include by consolidation, joinder, or in any other manner any other individual or entity (including Engineer, and Engineer's consultants and the officers, directors, partners, agents, employees or consultants of any of them) who is not a party to this Contract unless:

SC-17.02.C.1. the inclusion of such other individual or entity is necessary if complete relief is to be afforded among those who are already parties to the arbitration; and

SC-17.02.C.2. such other individual or entity is substantially involved in a question of law or fact which is common to those who are already parties to the arbitration and which will arise in such proceedings.

SC-17.02.D. The award rendered by the arbitrator(s) shall be consistent with the agreement of the parties, in writing, and include a concise breakdown of the award, and a written explanation of the award specifically citing the Contract provisions deemed applicable and relied on in making the award.

SC-17.02.E. The award will be final. Judgment may be entered upon it in any court having jurisdiction thereof, and it will not be subject to modification or appeal, subject to provisions of the Laws and Regulations relating to vacating or modifying an arbitral award.

SC-17.02.F. The fees and expenses of the arbitrators and any arbitration service shall be shared equally by Owner and Contractor.

17.02.F. The fees and expenses of the arbitrators and any arbitration service shall be shared equally by Owner and Contractor.

SC-17.03. Add the following new paragraph immediately after Paragraph 17.02:

SC-17.03 Attorneys' Fees: For any matter subject to final resolution under this Article, the prevailing party shall be entitled to an award of its attorneys' fees incurred in the final resolution proceedings, in an equitable amount to be determined in the discretion of the court, arbitrator, arbitration panel, or other arbiter of the matter subject to final resolution, taking into account the parties' initial demand or defense positions in comparison with the final result.

END OF SECTION

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SECTION 01 02 00 - ALLOWANCES

PART 1 GENERAL

1.1 SUMMARY

Include allowances stated in the Bid Form in the Contract Sum.

Allowance amounts will be utilized at the request of the Owner on a case-by-case basis to cover addition services as needed, if necessary only.

Administration of Allowances

A. Contractor's duties in selection of products under allowances:

1. Assist the Engineer and Owner in determining qualified suppliers or installers.

2. Obtain bids from suppliers and installers when requested by the Engineer.

3. Make appropriate recommendations for consideration of the Engineer.

4. Notify the Engineer promptly of:

    a. Reasonable objections against a supplier, or party under consideration for installation.
    b. Effect on the Construction Schedule anticipated by selections under consideration.

B. Adjustment of Costs

1. Should the net cost be more or less than the specified amount of the allowance, the Contract Sum will be adjusted accordingly by Change Order or Construction Change Directive.

2. At Contract Close-out, reflect approved changes to the Contract Sum in the final application for payment.

C. Provide the following allowances:

1. Additional work as otherwise approved and directed by Owner/Engineer.

2. Refer to the Bid Form for amount.

END OF SECTION

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SECTION 01 10 00 – SUMMARY OF WORK

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Work covered by Contract Documents.
2. Site access
3. Work by Owner or other Work at the Site.
4. Owner-furnished products.
5. Contractor's use of Site and premises.
6. Future work.
7. Work sequence.
8. Owner occupancy.
9. Permits.
10. Specification conventions.

11. Work Covered by Contract Documents

B. The Project consists of miscellaneous improvements at the raw water intake pump station in Alcoa, Tennessee. The work involves the following.

a. Remove the manual gate operator for the existing sluice gate at the intake pump station. Install a new electrically actuated actuator, a new actuator floor stand, new gate extension stem and coupling(s), new wall mounted stem guides, and associated hardware. Provide necessary concrete repairs, electrical circuit and all necessary electrical and mechanical system connections.

b. Remove and replace the existing bar screen protecting the submerged sluice gate. Install a new metal fabricated coarse bar screen and a new screen deflector unit per the contract documents. Replacement work shall be performed underwater and some river restoration may be required. River restoration involves moving silt and solids that may have deposited at the bottom of the river to allow removal of the existing screen and installation of the new screen. The extent of silt covering the work area is noted in Exhibit B at the end of the technical specifications section.

c. Remove the existing butterfly valve and associated piping from the discharge side of the raw water intake pump and replace with the new valve and accessories. Furnish all required hardware and appurtenances required to put the system back together and coordinate startup and testing.

d. Coordinate demolition and restoration activities to allow installation of the proposed units.

e. Proposed work shall not interfere with the operation and/or maintenance of the other pumping units. Provide necessary blind flanges to the existing piping to enable the system to resume pumping.

f. Restore project area to preconstruction conditions.

g. An allowance, as directed by the Owner, has been established and included in the project budget to account for unforeseen work relating to the installation, mounting, and operation of the new equipment. The amount noted shall be included in the contractor's bid. A change order shall be executed at the end of the project to reconcile the amount remaining.

2. The Contractor will also be responsible for:

a. Obtaining all the required permits to perform the Work, (e.g., electrical, plumbing, etc.).

b. Procurement of all materials required to construct the Work.

c. Provide system testing, training, and startup and coordinate with Engineer, Equipment supplier, and Owner for completion of the Work.

Work associated with the bar screen replacement shall be conducted in submerged river conditions by a diving team/contractor. Some silt and mud accumulation is anticipated in front of the existing screen based on a recent river bed bathymetry. Water jetting and debris removal may be required to remove silt and solids around the intake so the existing bar screen can be removed and the new screen can be installed.

C. The defined Work elements above are a general outline of principal features of the Work and does not in any way limit the responsibility of the Contractor(s) to perform all Work and furnish all equipment, labor and materials required by the Contract Documents.

D. The Raw Water Intake Pump Station is owned and operated by the City of Alcoa, TN.

1.2 SITE ACCESS

A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings and as indicated by requirements of this Section.

B. Use of Site: Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Driveways, Walkways and Entrances: Keep driveways, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

a. Schedule deliveries to minimize use of driveways and entrances by construction operations.

b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Condition of Existing Buildings: Maintain portions of existing buildings affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.3 WORK BY OWNER OR OTHERS

1. Refer to Section 00 31 00.

1.4 CONTRACTOR'S USE OF SITE AND PREMISES

A. The Work included in the Contract Documents is to be performed while the existing water treatment operations must continue in operation during construction. The Contractor shall always cooperate fully with the Owner and the Engineer to ensure that the production capability of the plant will continue and that any interruption to plant operations are minimized.

1. The specific major requirements for maintaining plant operations are listed below. These requirements are not necessarily complete in every detail:

2. Five day's-notice shall be given to the Owner by the Contractor when any interruption of or modification to the operation of the existing plant and/or piping is desired.

3. Follow the sequence of construction requirements as described in Section 01 12 16, Work Sequence.

B. Partial Owner Occupancy: Owner will occupy the premises during entire construction period Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.

C. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.

D. Provide not less than 7-day notice to Owner of activities that will affect Owner's operations.

E. Access to Site: Limited to weekdays from 7 am to 4:30 pm unless otherwise approved.

1. Noisy and Disruptive Operations (such as Use of Jack Hammers and Other Noisy Equipment): Not allowed in close proximity to existing building during regular hours of operation. Coordinate and schedule such operations with Owner to minimize disruptions.

F. Utility Outages and Shutdown:

1. Coordinate and schedule electrical and other utility outages with Owner.

2. At least one week before scheduled outage, submit Outage Request Plan to Architect/Engineer itemizing the dates, times, and duration of each requested outage.

G. Construction Plan: Before start of construction, submit a plan regarding access to Work, use of Site, and proposed utility outages for acceptance by Owner. After acceptance of plan, construction operations shall comply with accepted plan unless deviations are accepted by Owner in writing.

H. All work shall be conducted between the hours of 7:00 a.m. and 4:30 p.m. on non-holiday weekdays only. No weekend work will be allowed. Requests for variations in work hours shall be made in writing for consideration by the Engineer. No work shall be conducted outside of the above-described days and hours without prior approval of the Engineer.

1.5 WORK SEQUENCE

A. Coordinate Sequencing of Construction Plan with Construction Progress Schedule in Section 01 32 16, Construction Progress Schedules.

B. Sequencing of Construction Plan: Before start of construction, submit construction plan regarding phasing of demolition, renovations, and new Work for acceptance by Owner. After acceptance of plan, construction sequencing shall comply with accepted plan unless deviations are accepted by Owner in writing.

1.6 OWNER OCCUPANCY

A. Schedule and substantially complete designated portions of the Work for occupancy before Substantial Completion of the entire Work.

1. Owner intends to occupy portions of the Project site during construction.

2. Owner's use and occupancy of designated areas before Substantial Completion of the entire Project do not relieve Contractor of responsibility to maintain specified insurance coverages on a 100 percent basis until date of final payment.

B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

C. Schedule the Work to accommodate Owner occupancy.

1.7 PERMITS

A. Unless provided for otherwise in these Contract Documents, all permits, licenses, and fees shall be obtained by the Contractor and all costs shall be borne by the Contractor. Contractor shall pay all plan check fees and other fees necessary to obtain permits and shall accommodate special inspections required thereof. Contractor shall be responsible for compliance with all permit provisions and shall accommodate all special inspections required thereof, all at no additional expense to the Owner beyond prices as bid.

B. Furnish all necessary permits for construction of Work including the following:

1. Electrical Inspections

1.8 SPECIFICATION CONVENTIONS

A. These Specifications are written in imperative mood and streamlined form. This imperative language is directed to Contractor unless specifically noted otherwise. The words "shall be" are included by inference where a colon (:) is used within sentences or phrases.

1.9 USE OF EXPLOSIVES

The use of explosives shall not be allowed on this Project. Alternative methods of excavation shall be utilized.

1.10 CONSTRUCTION WITHIN STATE WATERS

Work shall be limited to the replacement of existing infrastructure. No modifications to the State Waters is allowed under this contract.

1.11 EXTENDED WARRANTY PROVISIONS – N/A

1.12 NPDES STORMWATER DISCHARGE PERMIT ACQUISITION BY CONTRACTOR

The Contractor shall prepare and submit an application to the TN Department of Environment and Conservation (TDEC) and obtain a stormwater discharge permit for the Project as needed. This permit must be obtained before construction can commence.

1.13 WORK WITH EXISTING ASBESTOS WATER PIPELINES

The Contractor shall comply with all requirements of TDEC with respect to the safe handling, removal, and disposal of asbestos cement pipe, including all reporting requirements.

1.14 NOT USED

1.15 ALTERNATE BID ITEM-N/A

PART 2 PRODUCTS -N/A

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 12 16 - WORK SEQUENCE

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes general sequencing, project phasing and coordination requirements for the Work.

B. Contract Requirements:

1. The existing intake pump station continuously (24hrs/d/7days/wk) receives and pumps raw water to the WTP. The functions of the facility shall not be compromised during the course of the Work, except as may be specified herein. Plan and prosecute the Work such that the operation of the existing water treatment plan is not interrupted, except as specified herein.

2. Control any and all leakage resulting from or integral to making all temporary and permanent piping connections/replacements. Provide any and all devices required to control, stop, divert, or dispose of any and all leakage. Isolate portions of the raw water line to minimize water leakage as allowed/coordinated with the Owner.

3. Owner may determine the order of precedence and the time and season at which any portion or portions of the Work shall be commenced and carried on in order to ensure proper completion of the Contract, proper operation of the intake pump station and water treatment plant, or compliance with permit conditions.

4. Substantial project completion shall be based on the date noted in the project Agreement form and shall imply the intake pump station and all its appurtenances shall be fully operational and in service.

C. Related Sections – NOT USED

1.2 SUBMITTALS

A. Section 01 33 00, Submittal Procedures: Requirements for submittals.

B. Work Sequencing Plan: At a minimum, to include the following:

1. Complete sequence of construction for all activities contained herein.

a. Major work activities to occur.
b. Assistance to be required of Owner's operating personnel.
c. Name and contact information of individual in charge of activity during startup.

1.3 PROJECT SPECIFIC WORK CONSTRAINTS

A. Constraints primarily relate to the need to continue to receive and pump raw water supply before the complete facility has been constructed, tested, commissioned, and accepted by Owner.

B. Constraints listed below involve limits on activities during construction. These limits relate to the critical nature of the proposed work.

1. Coordinate construction schedule and operation with Owner.

2. Field Measurements and Assessment:

A. Remove existing coarse bar screen from the outside wall of the intake pump station. Remove existing anchor bolts and provide wall repairs as needed/specified. Take field measurements for the fabrication and installation of the proposed coarse bar screen and screen deflector and evaluate volume of silt/grit removal required from the bottom of the river, if any. Also, confirm mounting of the new screen and top penetration placement for new stem extension.

B. Coordinate grit removal/displacement just before the installation of the new coarse bar screen and screen deflector unit.

C. Confirm stem connection details with existing sluice gate. Measure the length of the sluice gate extension stem and provide necessary field measurements to the equipment supplier for the proposed gate controls and other proposed appurtenances.

D. Secure and have available on site temporary bypass pumping capability during any temporary system shutdown or downtime.

E. Coordinate all proposed work with equipment fabrication and delivery constraints.

F. Provide all critical equipment submittals to the Engineer and Owner within 60 days from the notice to proceed.

G. Contractor may have up to an 10-hr shutdown of the raw water pump station for system/equipment replacements with proper coordination with the Owner.

3. Concrete Work under Submerged Conditions:

The Contractor will perform work under submerged conditions. Such work shall include special provisions and materials suitable for underwater environment. Concrete repairs and cored holes shall be performed by experienced divers as required by the contract documents. Contractor shall coordinate any system downtime required with the Owner during such work.

3. In case crane services are provided from the river bank, a temporary construction entrance shall be provided with crushed stone to stabilize the area where heavy machinery will be deployed.

1.4 GENERAL WORK CONSTRAINTS

A. Constraints primarily relate to interfacing with and working with existing pipelines, power supply, equipment replacement while in use, and other aspects of the operating the intake pumping facility.

B. Make every effort to give proper attention to each of these items so as to minimize interruptions of the existing facilities and avoid delays that may result if the constraints are not observed.

C. Do not operate any of the existing equipment without written permission from Owner naming the specific piece of equipment, operator(s), and dates equipment may be used. Contractor is liable for any loss or damage caused to property or equipment or any personal injury resulting from or related to this usage.

D. Extended Working Hours: If it is desired to perform any Work outside the specified working hours, obtain written permission from Owner and all necessary permitting agencies, and make all necessary arrangements prior to commencing.

1.5 TEMPORARY SHUTDOWNS

A. Temporary shutdowns are to be avoided at all cause. When/where needed, short duration shutdowns (up to 10-hours) shall be closely coordinated, reviewed, and approved in writing with the Owner. A two-week advance notice is required. Temporary bypass pumping shall be in place and coordinated with the Owner. A 24-hour break between any 10-hour shut down is required.

B. The raw water pumps can't operate with the 20" butterfly valve removed as there is no way to isolate the pumps. In the event that the contractor can't complete the 20" butterfly valve installation within the 10-hour window, the contractor must have the means to temporarily block the pump discharge line (blind flange and adapters/mega-lug) so the pumps can be turned on prior to 10-hr. This equipment must be onsite and assembled ready to install as a back-up plan to completing the valve installation.

1.6 INTERRUPTION OF UTILITY SERVICE

A. Indicate required shutdowns of existing utilities or interruptions of existing operations on Progress Schedule. Interruptions to utility service will be allowed to the extent that customer service will not be adversely compromised.

B. Submit requests for interruptions to utility service not less than five business days in advance of the date scheduled for the interruption.

C. Following receipt of the request, Engineer will notify Contractor if the requested date will be permitted. Evaluation of the request will be based upon the availability of the utility owner's personnel to assist and monitor utilities during the shutdown period and impact to customer service.

D. Minimize the period of interruption by thorough advance planning. Procure and provide all required materials, equipment, and labor on site during the shutdown.

E. Do not begin interruption until written authorization is received from Engineer.

F. Consider work on multiple tasks during short duration shutdowns.

G. Consider the addition of necessary piping, fittings, and butterfly valve on the existing pump discharge pipe during a planned shutdown.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

WORK CHANGE DIRECTIVE NO.: [NUMBER]

Owner:	City of Alcoa, TN	**Owner's Project No.:**	
Engineer:	Consor	**Engineer's Project No.:**	23-1747
Contractor:	*[Name]*	**Contractor's Project No.:**	*[Number]*
Project:	Raw Water Intake PS Improvements- 2025		
Date Issued:	*[MONTH, DATE, YEAR]*	**Effective Date:**	*[MONTH, DATE, YEAR]*

Contractor is directed to proceed promptly with the following change(s):

Description:

[Description of the change to the Work]

Attachments:

[List documents related to the change to the Work]

Purpose for the Work Change Directive:

[Describe the purpose for the change to the Work]

Directive to proceed promptly with the Work described herein, prior to agreeing to change in Contract Price and Contract Time, is issued due to:

Notes to User—*Check one or both of the following*

☐ Non-agreement on pricing of proposed change. ☐ Necessity to proceed for schedule or other reasons.

Estimated Change in Contract Price and Contract Times (non-binding, preliminary):

Contract Price: $ _____ *[increase] [decrease] [not yet estimated].*

Contract Time: _____ days *[increase] [decrease] [not yet estimated].*

Basis of estimated change in Contract Price:

☐ Lump Sum ☐ Unit Price ☐ Cost of the Work ☐ Other

	Engineer	Authorized by Owner
By:	_____	_____
Title:	_____	_____
Date:	_____	_____

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CHANGE ORDER NO.: [NUMBER]

Owner:	City of Alcoa, TN	**Owner's Project No.:**	
Engineer:	Consor	**Engineer's Project No.:**	23-1747
Contractor:	*[Name]*	**Contractor's Project No.:**	*[Number]*
Project:	Raw Water Intake PS Improvements 2025		
Date Issued:	*[MONTH, DATE, YEAR]*	**Effective Date:**	*[MONTH, DATE, YEAR]*

The Contract is modified as follows upon execution of this Change Order:

Description:

[Description of the change]

Attachments:

[List documents related to the change]

Change in Contract Price	Change in Contract Times (days)
Original Contract Price: $ _____	Original Contract Times: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] from previously approved Change Orders No. 1 to No. *[Number]*: $ _____	*[Increase] [Decrease]* from previously approved Change Orders No.1 to No. *[Number]*: Substantial Completion: _____ Ready for final payment: _____
Contract Price prior to this Change Order: $ _____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] this Change Order: $ _____	*[Increase] [Decrease]* this Change Order: Substantial Completion: _____ Ready for final payment: _____
Contract Price incorporating this Change Order: $ _____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for final payment: _____

	Recommended by Engineer *(if required)*	Authorized by Owner
By:		
Title:		
Date:		

	Authorized by Contractor
By:	
Title:	
Date:	

REQUEST FOR INFORMATION (RFI)

RFI No.: _____ **RFI Date:** _____

Owner Job No.: _____ **Consor Job No.:** 23-1747

Project Name: Raw Water Intake Pump Station Improvements 2025

Owner: City of Alcoa, TN

Contractor: _____

Subject: _____

Spec Sections/Drawing Nos.: _____

Information Request:

Potential Cost Impact? **YES** ❑ **NO** ❑ **UNKNOWN** ❑

Potential Schedule Impact? **YES** ❑ **NO** ❑ **UNKNOWN** ❑

Date Reply Requested By: _____

Requested By: _____ **Date:** _____

Response:

Response Action:

❑ Above is consistent with the intent and reasonably inferable from Contract Documents.
❑ The above is considered a change. The following documents will be used for processing:

Response By: _____ **Date:** _____

cc: _____

_____

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SECTION 01 29 02 - MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 SUMMARY

A. The following items describe the scope of the Work for Project and are further clarified through the Specifications and Drawings. The Work described in each bid item may contain Work from one or several Specification Sections. All other Work not specifically mentioned in the bid item description list described below shall be considered incidental to the Work performance and merged into the various unit and lump sum prices bid.

1.2 RELATED SECTIONS

A. All Specification Sections related to this Section.

1.3 SUBMITTALS

A. Schedule of Values for lump sum pay items

B. Application for Payment

C. Final Application for Payment

1.4 UNIT QUANTITIES SPECIFIED

A. Quantities indicated in the Bid Schedule are for bidding award purposes only. Quantities and measurements supplied or placed in the Work and measured by the Engineer determine payment.

B. If actual Work requires more or fewer quantities than those quantities indicated in the Bid Schedule, provide the required quantities at the unit prices installed.

C. Contractor's overhead and profit is to be distributed across the costs for each area of Work in a directly proportional manner.

D. For items on which progress payments will be requested for stored materials, break down value into:

1. Cost of materials, delivered and unloaded.
2. Total installed value.

E. Schedule of values for lump sum pay items:

1. Provide a detailed breakdown of the lump sum pay item showing amounts and quantities allocated to each of the various areas of Work, as specified herein and as required by General Conditions.

2. Upon request of Owner, support amounts and quantities with data substantiating their correctness.

3. Identify installed value of Work in sufficient detail to serve as basis for computing values for progress payments during construction.

1.5 GENERAL BID ITEM SCHEDULE

Measurement and payment will be on a unit price basis in accordance with the prices set forth in the proposal for individual work items. Where work is required but does not appear as a separate item in the proposal, the cost for that work shall be included and absorbed in the unit prices named in the proposal. Contractor shall make a careful assessment when preparing the bid.

A. Bid Item 1: Raw Water Intake PS Improvements: Lump sum payment for all the work, materials, supplies, and labor necessary for the replacement of the coarse bar screen, addition of a screen deflector unit, replacement of the sluice gate control system, and butterfly valve replacement. Cost shall include temporary bypass pumping, electrical work, diving, crane utilization, and other mobilization services.

B. Bid Item 2: Allowance: Refer to assigned value noted on the bid form.

~~C. Alternate Bid Item #1: N/A~~

1.6 APPLICATION FOR PAYMENT

A. Unless otherwise agreed to use the Contractor's Application for Payment form provided by the Owner.

B. Preparation:

1. Include accepted lump sum pay item schedule of values for each area of Work, as appropriate.

2. List each Change Order and Written Amendment executed prior to date of submission as a separate line item.

3. Complete the Stored Material Summary, as applicable, and any supporting information as may be requested by Engineer or Owner.

4. Round values to nearest dollar.

5. Execute the Contractor's Certification by authorized officer of the Contractor.

1.7 PAYMENT

A. Progress Payments will be made on a monthly basis.

B. The cut-off date for Contractor's monthly application for Payment shall be established at the Preconstruction Conference or as otherwise agreed to.

C. Contractor's submission of monthly payment applications shall be within 5 days of the cut-off date.

D. Monthly updates to the Construction Progress Schedule are required prior to payment processing.

1.8 NONPAYMENT FOR REJECTED OR UNUSED PRODUCTS

A. Payments will not be made for the following:

1. Loading, hauling and disposing of rejected material.

2. Quantities of material wasted or disposed of in manner not called for under the Contract Documents.

3. Rejected loads of material, including material rejected after it has been placed by reason of failure of Contractor to conform to provisions of the Contract Documents.

4. Material not unloaded from transporting vehicle.

5. Defective work not accepted by Owner.

6. Material remaining on hand after completion of the Work.

1.9 PARTIAL PAYMENT FOR STORED MATERIALS AND EQUIPMENT

A. Partial Payment:

1. No partial payments will be made for materials and equipment delivered or stored unless shop drawings for the materials and equipment are acceptable to the Engineer. Acceptable shall mean the Shop Drawings have an Approved as Submitted or and Approved as Noted disposition.

2. For materials and equipment, for which an Operation and Maintenance Manual is required, no partial payment will be made for materials and equipment stored or installed unless the preliminary Operation and Maintenance Manual has been submitted and accepted by the Engineer.

3. No partial payment greater than 80% of the invoiced cost of the material and equipment stored or installed will be made until the final Operation and Maintenance Manual has been submitted and accepted by the Engineer.

B. Final Payment will be made only for products incorporated into the work; remaining products, for which partial payments have been made, shall revert to Contractor unless otherwise agreed, and partial payments. made for these items will be deducted from final payment.

1.10 SUPPLEMENTS - N/A

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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

APPLICATION FOR PAYMENT

Prepared By

EJCDC®
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

ACEC
AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

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www.nspe.org

American Council of Engineering Companies
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(202) 347-7474
www.acec.org

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400
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NOTE: EJCDC publications may be purchased at www.ejcdc.org, or from any of the sponsoring organizations above.

GUIDELINES FOR THE INTENDED USE OF EJCDC C-620, APPLICATION FOR PAYMENT

1.0 PURPOSE AND INTENDED USE OF THE DOCUMENT

The Application for Payment is used to facilitate periodic progress payments to the Contractor for Work completed and for stored materials and equipment (referred to in this document as "Stored Materials").

For additional information regarding the Application for Payment, see EJCDC® C–700, Standard General Conditions of the Construction Contract (2018), Paragraph 15.01, and EJCDC® C–001, Commentary on the 2018 EJCDC Construction Documents (2018).

2.0 APPLICATION FOR PAYMENT OVERVIEW

This document was prepared in Microsoft Excel due to the number of calculations involved in the preparation of the Application for Payment. The application consists of a Summary worksheet, and 3 supporting worksheets: Lump Sum worksheet, Unit Price worksheet, and Stored Materials worksheet.

2.1 *Summary Worksheet* — calculates the amount to be paid to the Contractor at the end of each Application for Payment period. This calculation imports numbers from the supporting worksheets to determine the value of the Work completed and Stored Materials, calculate retainage, and deduct amounts previously paid to determine the amount the Contractor should be paid for the current application period. Application periods are typically one month; however these periods may be extended when Contractor's efforts do not result in the billable completion of Work or storage of materials and equipment during the payment period.

2.2 *Lump Sum Worksheet* — calculates the total value for completed Work for which compensation is paid on a Lump Sum basis. The schedule of values included in this worksheet reflects a breakdown of lump sum Work items to which Contractor and Engineer have agreed, pursuant to Article 2 of the General Conditions. Costs for Stored Materials associated with lump sum items are included on this worksheet to calculate the total value for completed lump sum Work and associated Stored Materials. This total is exported to the Summary worksheet. Separate totals for Work Completed and for materials currently stored are also exported to the Summary worksheet for use in calculating the amount of retainage to be held for each.

2.3 *Unit Price Worksheet* — calculates the total value for completed Work for which compensation is paid on a Unit Price basis. The schedule of values included in this spreadsheet is typically a tabulation of Unit Price items from the Agreement. Costs for Stored Materials associated with unit price items are included in this worksheet to calculate the total value for completed Unit Price Work and associated Stored Materials. This total is exported to the Summary worksheet. Separate totals for Work Completed and for Materials Currently Stored are also exported to the Summary worksheet for use in calculating the amount of retainage to be held for each.

2.4 *Stored Materials Worksheet* — calculates the total value for materials and equipment that have been purchased and are being stored until they are incorporated into the Work. This worksheet adds materials and equipment to the worksheet as they are brought to the site and stored; such Stored Materials are then deducted from the Stored Materials worksheet total as they are incorporated into the Work, providing a running net value for the materials and equipment remaining in storage. The values of Stored Materials must be manually added to the Lump Sum or Unit Price line items. These do not automatically update when changes are made. The amount of materials remaining in storage is eligible for payment but must be tracked separately from Work completed since different retainage rates may apply to Work completed and Stored Materials.

3.0 Instructions for filling out the Payment Application form

3.1 Project-specific information is to be entered in the top portion (header) of the Summary worksheet. This same information will automatically be copied to the other worksheets to complete the headers on all other worksheets.

3.2 Outside of the header, data can be entered in non-shaded cells when the sheet is protected. Cells shaded light blue contain equations that will automatically transfer data from other cells or make calculations to complete the worksheet. Altering any of these cells can result in errors in the Application for Payment. It is recommended that the worksheets be protected at all times unless alterations are deliberately being made to the Application for Payment form other than to enter data. See Paragraph 4.0 below for information on Protection of Worksheets.

3.3 Enter information regarding each item in the Lump Sum and/or Unit Price worksheets. For Lump Sum projects, each item should represent an item in the schedule of values prepared by the Contractor and approved by the Engineer/Owner, breaking down the Lump Sum amount into measurable components. For Unit Price contracts, use numbers from the Agreement as the schedule of values. Specific information on the data to be entered into each column may be seen by clicking on the header description for that column. Similar comments may be seen for cells in the "Totals" row that indicates how the number is calculated and where this number is exported to another part of the spreadsheet. See the Commentary for additional information.

3.4 The equations in the Summary worksheet use numbers imported from both the Lump Sum and Unit Price worksheets. Projects will typically either use the Lump Sum or the Unit Price worksheet, but some projects may use both. If one of the worksheets is not used, it should be hidden and not deleted. If it is deleted, Users will need to correct the equations in the Summary worksheet by unprotecting the worksheet and editing the equations. To hide a worksheet, right click on the worksheet tab at the bottom of the worksheet and select "Hide." To unhide a worksheet, right click on any worksheet tab and select "Unhide," and then select the worksheet to unhide and click "Okay." This same process may be used to hide these Guidelines for Use.

4.0 Protection of Worksheets

4.1 The cells in this Workbook that create the forms or contain equations have been coded to "lock" the cells that should not be altered. It is recommended that the Workbook be Protected (cells locked) at all times unless it is necessary to add or delete rows. Directions for adding and deleting rows are provided in the next section. Passwords can be used to lock the Protect / Unprotect settings on spreadsheets, however the worksheets in this workbook do not require a password.

4.2 To unprotect a worksheet, click on the "Review" menu tab at the top of Excel, then click "Unprotect Sheet." To protect a worksheet, click on the "Review" menu tab at the top of Excel, then click "Protect Sheet." This will open a dialog box in which the User is allowed to select protection options. It is recommended that only the top two checkboxes for "Select Locked Cells" and "Select Unlocked Cells" be checked. This will reset the protection for the Worksheet.

5.0 Adding and Deleting Rows

5.1 A limited number of blank rows are provided in the Lump Sum, Unit Price, and Stored Material worksheets. Additional rows may be added to these worksheets by the User. The first step in this process is to unprotect the worksheet as previously discussed. After the sheet is unprotected, move with caution to prevent inadvertently deleting any cells that contain equations. To insert a row, right click in the row heading at the left of the spreadsheet and select "Insert." A new row will be inserted at the location where the cursor was placed in the row heading. If more than one new row is desired, left click and drag the cursor to include the desired number of rows, right click in the selected row headings and then select "Insert." It is important that the line immediately above the "Totals" row not be included in the rows selected. Doing so will require that equations in the "Totals" row be adjusted. When rows are inserted, Excel automatically adjusts the equations to include the new rows, unless the row directly above the "Totals" row is also selected.

5.2 After new rows are inserted, it is important to copy a line from one of the original rows so correct formatting and equations are copied into each new row. To do this, select the row to be copied by clicking the cell in Column A and dragging the cursor to the last column in the table. Then select "Copy" from the menu or type CTRL+C to copy the cells. Excel will show that this row has been copied by showing a moving dashed line around the cells that are to be copied. Then select the new rows into which the information is to be copied as before and select Paste from the menu or type CTRL+V.

5.3 To delete an unused row, right click in the row heading on the left of the spreadsheet for the row to be deleted and select "Delete." The selected row will be deleted. If more than one row is to be deleted, left click and drag the cursor to the desired number of rows to be deleted and then right click to open the menu and select "Delete." Unlike the admonition on adding new rows, it is okay to delete the row just above the "Totals" row.

5.4 After rows have been added or deleted, it is important reset the worksheet protection.

6.0 Saving Files

This file is provided as a Microsoft ® Excel Open XML workbook template (.xltx) to prevent this file from being inadvertently changed. When an application for payment is created for a specific project it should be saved as an Excel workbook (.xlxs) file. To do this, select Save As (F12), type in a new file name and select Excel Workbook (.xlxs) from the drop down Save As Type menu.

7.0 License Agreement

Contractor's Application for Payment

Owner:	City of Alcoa, TN	**Owner's Project No.:**	
Engineer:	Consor	**Engineer's Project No.:**	23-1747
Contractor:		**Contractor's Project No.:**	
Project:	Raw Water Intake PS Improvements 2025		
Application No.:		**Application Date:**	
Application Period:	**From**	**to**	

1. Original Contract Price					$ -
2. Net change by Change Orders					$ -
3. Current Contract Price (Line 1 + Line 2)					$ -
4. Total Work completed and materials stored to date (Sum of Column G Lump Sum Total and Column J Unit Price Total)					$ -
5. Retainage					
a.		X	$ -	Work Completed	$ -
b.		X	$ -	Stored Materials	$ -
c. Total Retainage (Line 5.a + Line 5.b)					$ -
6. Amount eligible to date (Line 4 - Line 5.c)					$ -
7. Less previous payments (Line 6 from prior application)					
8. Amount due this application					$ -
9. Balance to finish, including retainage (Line 3 - Line 4)					$ -

Contractor's Certification

The undersigned Contractor certifies, to the best of its knowledge, the following:
(1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;
(2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such liens, security interest, or encumbrances); and
(3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

Contractor:

Signature: **Date:**

Recommended by Engineer		**Approved by Owner**	
By:		**By:**	
Title:		**Title:**	
Date:		**Date:**	

Approved by Funding Agency

By:

Title:

Date:

Progress Estimate - Lump Sum Work

Contractor's Application for Payment

Owner:	City of Alcoa, TN	**Owner's Project No.:**	
Engineer:	Consor	**Engineer's Project No.:**	23-1747
Contractor:		**Contractor's Project No.:**	
Project:	Raw Water Intake PS Improvements 2025		

Application No.: _____ **Application Period:** **From** _____ **to** _____ **Application Date:** _____

A	B	C	D	E	F	G	H	I
			Work Completed					
Item No.	Description	Scheduled Value ($)	(D + E) From Previous Application ($)	This Period ($)	Materials Currently Stored (not in D or E) ($)	Work Completed and Materials Stored to Date (D + E + F) ($)	% of Scheduled Value (G / C) (%)	Balance to Finish (C - G) ($)
			Original Contract					
			-			-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
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						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
	Original Contract Totals	$ -	$ -	$ -	$ -	$ -		$ -

Progress Estimate - Lump Sum Work

Contractor's Application for Payment

Owner:	City of Alcoa, TN	**Owner's Project No.:**	
Engineer:	Consor	**Engineer's Project No.:**	23-1747
Contractor:		**Contractor's Project No.:**	
Project:	Raw Water Intake PS Improvements 2025		

Application No.: _____ **Application Period:** **From** _____ **to** _____ **Application Date:** _____

A	B	C	D	E	F	G	H	I
			Work Completed					
Item No.	Description	Scheduled Value ($)	(D + E) From Previous Application ($)	This Period ($)	Materials Currently Stored (not in D or E) ($)	Work Completed and Materials Stored to Date (D + E + F) ($)	% of Scheduled Value (G / C) (%)	Balance to Finish (C - G) ($)
Change Orders								
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
Change Order Totals		$ -	$ -	$ -	$ -	$ -		$ -
Original Contract and Change Orders								
Project Totals		$ -	$ -	$ -	$ -	$ -		$ -

EJCDC C-620 Contractor's Application for Payment

Stored Materials Summary **Contractor's Application for Payment**

Owner:	City of Alcoa, TN	**Owner's Project No.:**	
Engineer:	Consor	**Engineer's Project No.:**	23-1747
Contractor:		**Contractor's Project No.:**	
Project:	Raw Water Intake PS Improvements 2025		

Application No.: ______ **Application Period:** From ______ to ______ **Application Date:** ______

A	B	C	D	E	F	G	H	I	J	K	L	M
						Materials Stored			Incorporated in Work			
Item No. (Lump Sum Tab) or Bid Item No. (Unit Price Tab)	Supplier Invoice No.	Submittal No. (with Specification Section No.)	Description of Materials or Equipment Stored	Storage Location	Application No. When Materials Placed in Storage	Previous Amount Stored ($)	Amount Stored this Period ($)	Amount Stored to Date (G+H) ($)	Amount Previously Incorporated in the Work ($)	Amount Incorporated in the Work this Period ($)	Total Amount Incorporated in the Work (J+K) ($)	Materials Remaining in Storage (I-L) ($)
								-			-	-
								-			-	-
								-			-	-
								-			-	-
								-			-	-
								-			-	-
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								-			-	-
								-			-	-
					Totals	$ -	$ -	$ -	$ -	$ -	$ -	$ -

SECTION 01 31 19 – PROJECT MEETINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B. Related Sections

1. Section 01 32 16 - Construction Progress Schedule
2. Section 01 70 00 – Execution and Closeout Requirements

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for project meetings, including, but not limited to, the following:

1. Pre-construction meeting.
2. Progress meetings.
3. Monthly construction schedule meetings.
4. As-built update meeting.
5. Coordination meetings.
6. Pre-installation meetings prior to starting certain work.
7. Commissioning meetings.
8. Project closeout meetings.
9. Owner training meetings.

1.3 PRECONSTRUCTION MEETING

A. The Owner will schedule a preconstruction meeting before starting construction, at a time convenient to the Contractor and the Owner, but no later than fifteen (15) days after the Notice to Proceed. The meeting will be held at the Project Site, or another convenient location as selected by Owner.

B. Attendance is required of the following:

1. Owner and Owner's consultants.

2. Owner Representatives.

3. Contractor's Superintendent and Project Manager. Contractor's QC Representative if different individual than the Project Manager.

4. Major subcontractors.

5. Others, as requested.

C. Discussion will cover items of significance, including the following:

1. Communication chain and persons authorized to direct changes.

2. The Work.

3. Site Representative's roles.

4. Work hours, sequence, phasing, and occupancy.

5. Special project procedures.

6. Procedures and processing:

    a. Application for payments.
    b. Amendments.
    c. Change Order Proposals (COP).
    d. Field Authorizations (FA).
    e. Engineering Change Directive (ECD).
    f. Proposal Request (PR).
    g. Requests for Information (RFI).
    h. Field decisions.
    i. Submittals.
    j. Others as appropriate.

7. Project Management Software access, use, and permissions.

8. Project record documents including review of as-builts on a regular basis during construction.

9. Construction facilities, and controls.

10. Temporary utilities.

11. Safety plans and procedures.

12. Security procedures.

13. Housekeeping procedures.

14. Utility shutdowns / Outage Request Form.

15. Parking.

16. Equipment deliveries and priorities.

17. Schedule Review.

18. Contractor's Quality Control System:

    a. CQC Representative.
    b. CQC daily report.

19. Hazardous material abatement procedures, if any.

20. Use of site and premises by Owner and Contractor.

21. Others, as appropriate.

D. The Owner will:

1. Conduct the meeting to review contract administration requirements.

2. Record, produce, and distribute copies of the minutes to all attendees within two (2) working days of the meeting.

3. The Contractor shall be responsible for distributing copies to all other subcontractors.

1.4 PROGRESS MEETINGS

A. For purposes of coordination and scheduling after start of the work, weekly Progress Meetings will be held to enable an orderly review of the construction progress and to provide for systematic discussion and analysis of concerns that may arise relative to execution of the work.

B. Contractor, and subcontractors as required, shall incorporate attendance at these meetings as part of the Base Bid of the project - no overtime payments will be authorized for Contractor or subcontractors to attend weekly Progress Meetings or other special meetings if required.

C. Meeting Locations: ADA accessible Contractor's project field office or Owner provided meeting room, unless otherwise agreed.

D. Attendance: Representatives attending meetings are required to be qualified and authorized to act on behalf of their firms. Attendance shall include:

1. Owner's consultants, as appropriate.
2. Owner Representatives.
3. Contractor's Superintendent, Project Manager, and QC Representative.
4. Subcontractors, as appropriate.
5. Suppliers, as appropriate.
6. Others, as appropriate.

E. Agenda: Discussion will pertain to items, such as:

1. A list of attendees and companies they represent.

2. Review and approve minutes of previous meeting; written corrections, additions and/or deletions to previous minutes acknowledged.

3. Review Short Interval Schedule.

4. Review Outages.

5. Review construction schedule; confirm current status of work.

6. Present corrective measures and procedures to regain project schedule, as applicable.

7. Present field observations, problems, and conflicts; discuss concerns pertaining to:

a. Civil items.
b. Structural items.

c. Mechanical items.
d. Electrical items.
e. Architectural items.

8. Discuss problems impeding progress schedule.

9. Review Contractor's quality control system; discuss any concerns and corrective measures.

10. Review submittal schedules and logs, present methods to expedite as required.

11. Review off-site fabrication.

12. Review procurement and delivery schedules.

13. Review outstanding RFIs.

14. Review proposed changes for:

    a. Effect on construction schedule and on completion date.
    b. Effect on any other contracts of the project.

15. Review COP log, change management, ECDs.

16. Confirm status of the "as-built" drawings and review required revisions to Project Record Documents; see update requirements specified below.

17. Confirm status of shop drawing submittals and approvals.

18. Review project safety.

19. Review any outstanding Non-Compliance Notices.

20. Review any tenant impacts.

21. Review any other business.

22. Confirm next meeting date, location, and time plus those requested to be in attendance.

F. Owner will:

1. Administer weekly Progress Meetings throughout work progress.

2. Record and distribute the following by e-mail within three (3) working days after the meeting: minutes, RFI, Submittal/Shop Drawing and Cost Change logs. Distribution to include all attendees. The General Contractor is responsible for distributing copies to all other subcontractors as required.

3. Provide paper copies of the minutes, RFI, ECD, Submittal/Shop Drawing and Cost Change logs to attendees at the next meeting.

4. Ascertain that work is prosecuted consistently with contract documents and construction schedules.

G. At Contractor's option, weekly progress meetings can be held integrally with monthly Construction Scheduling Meeting and As-Built Update meeting specified herein.

H. Contractor shall be responsible for providing the following at each meeting:

1. Current (and updated if necessary) construction schedule which includes the past week and three (3) week 'look ahead'.

2. Current (and updated if necessary) submittal schedule.

1.5 MONTHLY CONSTRUCTION SCHEDULE MEETINGS, REPORTING

A. In addition to specific coordination meetings for each element of work, initial schedule meeting, and other regular project meetings for other purposes, hold general scheduling meetings each month to review status according to recent updated schedule reports.

B. Require each entity then involved in planning, coordination, or performance of work to be properly represented at each meeting. Review each entity's present and future needs including interface requirements, time, sequences, deliveries, access, site utilization, temporary facilities and services, hours of work, hazards and risks, housekeeping, change orders, and documentation of information for payment requests.

C. Discuss whether each element of current work is ahead of schedule, on time, or behind time in relation with updated progress schedule. Determine how behind-time work will be expedited, and secure commitments from entities involved in doing so.

D. Discuss whether schedule revisions are required to ensure that current work and subsequent work will be completed within Contract Time.

E. Review everything of significance which could affect progress of the Work.

F. Owner will take meeting notes of each meeting and distribute copies to everyone in attendance. General Contractor shall distribute copies of meeting notes to all others affected by decisions or actions resulting from each meeting.

1.6 AS-BUILT UPDATE MEETING

Following each monthly scheduling meeting, Contractor shall meet with all major subcontractors whose work is in progress at the site, including but not limited to mechanical, electrical, masonry, structural steel, civil, and as otherwise designated, to review and verify incorporation of all revisions of the previous month and transfer all non-recorded installed record information to the day-by-day working set of "Project Record Copy" blueprints or electronic drawings on the Project Management Software Program, with all revisions clearly indicated.

1.7 PRE-INSTALLATION MEETINGS

A. General: Prior to commencement of work listed below or as otherwise determined by the Owner, the General Contractor or their general superintendent, the responsible foremen for the subcontractors performing said Work, plus all associated sub-subcontractors, suppliers, fabricators, vendors, and others as appropriate, shall attend a meeting for the purpose of

establishing a full understanding of the procedures and requirements for the orderly progress of the designated work.

B. All subcontractors and major suppliers are required to attend these pre-installation meetings prior to commencing work of their respective specifications Section, or as required by related work in other specification sections. Contractor may elect to group several Sections or Divisions to minimize the number of these meetings.

C. Require attendance of entities directly affecting, or affected by, work of the Section including Owner Representatives, Contractor's Project Manager and Superintendent with Lead person performing the work, and/or the appropriate subcontractors/Suppliers/Fabricators.

D. Contractor shall notify the Owner of the Contractor's scheduled pre-installation meeting not less than seven (7) days prior to the scheduled start of any of the work listed below so that the Owner may schedule their appropriate staff. All applicable submittals as well as the subcontractor's safety plan and insurance certificates shall have been submitted to and reviewed by the Owner prior to scheduling this meeting. Work requiring pre-installation meetings shall be found in the various technical specification sections.

E. Work Plan: Develop a written work plan for each definable segment of work. Complete the work plan prior to the pre-installation meeting, and this shall serve as the basis for discussion and contract compliance. Include a review of contract requirements to assure that materials and equipment delivered and assembled for construction conform to contract requirements and that control testing, including procedures, are finalized. Examine work areas, upon which new work is to be placed, to verify the substrate for the new phase of work.

F. Agenda

1. Review technical contract requirements with any options. Contractor to submit any options and resolve with Owner any conflicts, interference, or compatibility problems.

2. Schedule. Include the work on the three (3) week Short Interval Schedule.

3. Review requirements as relates to:

    a. Schedule.

    b. Submittals and mock-ups - status of approval; review contract requirements. Note: All submittals pertaining to a pre-installation meeting shall have been reviewed and approved by Owner and returned to Contractor.

    c. Tolerances.

    d. Manufacturer's requirements.

    e. Weather limitations.

4. Materials - available and ready for use.

5. Persons responsible for work.

6. Pre-installation Work Plan.

7. Quality control methods:

    a. Testing/Inspection requirements - required inspections and tests, who samples and how often? Criteria for performance of work.

    b. Acceptability of substrates - criteria for approving substrate.

    c. Required performance results.

    d. Recording requirements.

8. Applicable governing rules and regulations.

9. Temporary facilities and controls:

    a. Safety, environmental controls, security, noise.

    b. Space and access limitations.

10. Protection of work, curing periods and related subjects.

11. Other business.

G. Contractor will record, reproduce, and distribute copies of minutes prior to the next meeting or within seven (7) days of each meeting to all meeting participants.

1.8 COMMISSIONING MEETINGS

A. Refer to respective sections of the various general, mechanical, and electrical Divisions of the Project Manual for associated commissioning meeting requirements.

1.9 PROJECT CLOSEOUT MEETINGS

A. For the purpose of attaining project closeout, commencing immediately following established date of Substantial Completion, Contractor's project manager and superintendent and all subcontractors who have outstanding punch list items associated with their work, or as otherwise requested and including all subcontractors involved in the building systems commissioning process, shall attend weekly closeout meetings which shall be held at the jobsite.

B. Such meetings shall be held to review and discuss the resolution of all punch list items in order to attain Final Completion. Closeout meetings shall continue on a weekly basis until all punch list items have been resolved and Final Completion is attained.

1.10 TRAINING MEETINGS FOR OPERATING INSTRUCTIONS OF OWNER'S PERSONNEL

A. Refer to Section 01 75 00 – Testing, Training and Commissioning for training requirements related to operating instructions of Owner's personnel.

1.11 ADDITIONAL MEETINGS

A. As the construction progresses, additional meetings may be required. These may be called at the direction of or by the Owner.

PART 2 NOT USED

PART 3 NOT USED

END OF SECTION

SECTION 01 32 16 - CONSTRUCTION PROGRESS SCHEDULES

PART 1 GENERAL

1.1 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.

2. Predecessor Activity: An activity that precedes another activity in the network.

3. Successor Activity: An activity that follows another activity in the network.

B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall project duration and contains no float.

D. Event: The starting or ending point of an activity.

E. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring project resource available to both parties as needed to meet schedule milestones and Contract completion date.

2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.

3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned project completion date.

4. No change orders (time or money) will be granted related to schedule delays until a delay occurs that is beyond the Contractor’s control, and which (i) impacts Project’s critical path, (ii) consumes available float or contingency time, and (iii) extends work beyond contract time(s) listed in the Agreement or as subsequently modified per change order.

F. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.2 SUBMITTALS

A. Submit the following shop drawings in accordance with Section 01 33 00.

B. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, and
2. PDF electronic file.

C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.

2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.

3. Total Float Report: List of all activities sorted in ascending order of total float.

E. Construction Schedule Updating Reports: Submit with Applications for Payment.

1.3 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Arrange Construction Progress Schedule to be consistent with format and organization of the Schedule of Values.

C. Coordinate Contractor's construction schedule with the submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.

2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE; GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Engineer.

2. Submittal Review Time: Include review and resubmittal times indicated in Section 01 33 00 Submittal Procedures in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.

3. Startup and Testing Time: Include time for startup and testing as described in Section 01 75 00 – Testing, Training, and Commissioning.

4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion and allow time for Engineer's administrative procedures necessary for certification of Substantial Completion.

5. Punch List and Final Completion: Indicate completion in advance of date established for Final Completion and allow time for Engineer's development of punch list and certification of Final Completion.

C. Recovery Schedule: When periodic update indicates the Work is 15 or more days behind the current accepted schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

D. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. CPM Schedule: Prepare Contractor's construction schedule using a time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 60 days after date established for the Notice to Proceed.

    a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Engineer’s acceptance of the schedule.

2. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.

3. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.

C. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

    a. Preparation and processing of submittals.
    b. Mobilization and demobilization.
    c. Purchase of materials.
    d. Delivery.
    e. Fabrication.
    f. Installation.
    g. Testing, Training and Startup.
    h. O&M Manual development.
    i. Punch list and final completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.

3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.

D. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.

E. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities.

PART 3 EXECUTION

3.1 CONTRACTOR’S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule onebefore each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.

2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.

3. As the Work progresses, indicate final completion percentage for each activity.

B. Distribution: Distribute copies of accepted schedule to Engineer, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.

2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION

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SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. This Section contains administrative and procedural requirements for submittals for review, information, and for Project closeout.

B. Section includes:

1. Schedule of Submittals.
2. Submittal requirements.
3. Submittal procedures.
4. Engineer review.
5. Resubmittal procedures.
6. Product data.
7. Shop Drawings.
8. Samples.
9. Design data.
10. Test reports.
11. Certificates.
12. Manufacturer's instructions.
13. Manufacturer's field reports.
14. Erection Drawings.
15. Construction progress schedules.
16. Breakdown of contract price.
17. Construction photographs.
18. Operation and maintenance (O&M) instructions.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Engineer's responsive action.

B. Informational Submittals: Written and graphic information and physical Samples that do not require Engineer's responsive action. Submittals may be rejected for not complying with requirements.

1.3 SCHEDULE OF SUBMITTALS

A. Within 10 days after the Effective Date of the Contract, Contractor shall submit to Engineer a preliminary Schedule of Submittals, including proposed list of major products proposed for use, with specification section reference, name of Manufacturer, supplier, trade name, subcontractor, and model number of each product. Provide a schedule of specific target dates for the submission and return of submittals and shop drawings required by the Contract Documents.

B. For products specified only by reference standards, indicate Manufacturer, trade name, model or catalog designation, and reference standards.

C. The list and schedule shall be updated and resubmitted when requested by the Engineer.

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

1.4 SHOP DRAWING AND SAMPLE SUBMITTAL REQUIREMENTS

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

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

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

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

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

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

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

1.5 SUBMITTAL PROCEDURES

A. Contractor shall submit Shop Drawings and Samples to Engineer for review in accordance with the accepted Schedule of Submittals.

B. Transmit each submittal with Engineer-accepted transmittal form certifying compliance with requirements of Contract Documents.

C. Sequentially number transmittal forms. Mark transmittal forms for resubmittals with original number and sequential alphabetic suffix.

D. Show each Submittal with the following numbering and tracking system:

1. Submittals shall be numbered according to specification section. For example, the first product submittal for Section 05 50 00 would be "05 50 00-1". Resubmittals of that submittal would be "05 50 00-1.1", followed by "05 50 00-1.2", and so on. The second product submittal for that Section would be "05 50 00-2".

2. Submittals containing product information from multiple sections of the specifications will not be reviewed. Contractor and/or their supplier shall divide submittals in a manner that meets the numbering and tracking system requirements stated herein.

3. Alternative method of numbering may be used if acceptable to Engineer.

E. Identify: Project, Contractor, subcontractor and supplier, pertinent drawing and detail number, and specification Section number appropriate to submittal.

F. Apply Contractor's stamp, signed or initialed, certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is according to requirements of the Work and Contract Documents.

G. Coordinate submission of related items.

1. All shop drawings for interrelated items shall be scheduled for submission at the same time.

2. The Engineer may hold shop drawings in cases where partial submission cannot be reviewed until the complete submission has been received or where shop drawings cannot be reviewed until correlated items affected by them have been received. When such shop drawings are held, the Engineer will advise the Contractor in writing that the shop drawing submitted will not be reviewed until shop drawings for all related items have been received.

H. When hard copies of submittals are provided by the Contractor, six copies of all materials shall be provided to the Engineer. Two copies of reviewed submittals will be kept by the Engineer, two copies of reviewed submittals will be transmitted to the Owner, and two copies of reviewed submittals will be returned to the Contractor. If the Contractor requests that more than two copies of the reviewed submittal be returned, then the Contractor shall submit the appropriate quantity of submittals.

I. When electronic transmittals of submittals are provided by the Contractor under established protocols described elsewhere in the Contract Documents or as jointly developed by the Owner, Engineer and Contractor, provide electronic submittals in portable document format (PDF) in addition to the source document format (Word, Excel, AutoCAD, etc.). Reviewed submittals will be returned to the Contractor as PDF electronic files.

J. For each submittal for review, allow not less than 14 days for Engineer review, excluding delivery time to and from Contractor.

K. Identify variations in Contract Documents and product or system limitations that may be detrimental to successful performance of completed Work.

L. Allow space on submittals for Contractor and Engineer review stamps or comments.

M. When revised for resubmission, the Contractor shall identify changes made since previous submission. A narrative of changes shall be provided, and shop drawings or calculations shall indicate that a revision was made.

N. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with review comments.

O. Submittals not requested will not be recognized nor processed.

P. Incomplete Submittals: Engineer will not review. Complete submittals for each item are required. Delays resulting from incomplete submittals are not the responsibility of Engineer.

1.6 ENGINEER REVIEW

A. Informational submittals and other similar data are for Engineer's information, do not require Engineer's responsive action, and will not be reviewed or returned with comment.

B. The Engineer’s review of submittals and shop drawings is not a check of any dimension or quantity and will not relieve the Contractor from responsibility for errors of any sort in the submittals and shop drawings.

C. Submittals made by Contractor that are not required by Contract Documents may be returned without action.

D. The Engineer will review the submitted data and shop drawings and return to the Contractor with notations thereon indicating "No Exception Taken", "Make Corrections Noted", "Rejected", "Revise and Resubmit", or "Submit Specified Item".

E. If more than two submissions of an item are required to meet the Project specifications, Contractor shall be responsible for Engineer’s charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

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

G. Engineer’s review will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.

H. Engineer’s review of a separate item as such will not indicate approval of the assembly in which the item functions.

I. Engineer’s review of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 1.4.C and Engineer has given written acceptance of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such accepted variation from the requirements of the Contract Documents in a Field Order.

J. Engineer’s review of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 1.4 A. and B.

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

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

M. Contractor shall perform the Work in compliance with the requirements and commitments set forth in returned Shop Drawings and Samples, subject to the provisions of Paragraph 1.6.I.

1.7 RESUBMITTAL PROCEDURES

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

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

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

PART 2 PRODUCTS

2.1 CONSTRUCTION PROGRESS SCHEDULES

A. Within 10 days after the Effective Date of the Contract, prepare and submit to the Engineer a practicable schedule showing the order in which the Contractor proposes to carry out the Work, the dates on which the important features of the work will start, and the contemplated dates for completing same. In addition to a time-scaled bar chart schedule depicting the Project critical path, the Contractor shall submit a detailed CPM logic diagram. The CPM diagram and time-scaled bar chart shall include the following:

- Construction activities
- Submittal and review of material samples and shop drawings
- Procurement and delivery of critical materials
- Fabrication, installation, and testing of special material and equipment
- Duration of work, including completion times of all stages and their sub-phases

The activities shall be separately identifiable by coding or use of sub-networks or both. The duration of each activity shall be verifiable by manpower and equipment allocation, in common units of measure, or by delivery dates and shall be justifiable by the Contractor upon the request of the Engineer.

Detailed subnetworks will include all necessary activities and logic connectors to describe the work and all restrictions to it. In the restraints, include those activities from the Project schedule which initiated the subnetwork as well as those restrained by it.

Include a tabulation of each activity in the computer mathematical analysis of the network diagram. Furnish the following information as a minimum for each activity:

- Event (node) number(s) for each activity
- Activity description
- Original duration of activities (in normal workdays)
- Estimated remaining duration of activities (in normal workdays)
- Earliest start date or actual start date (by calendar date)
- Earliest finish date or actual finish date (by calendar date)
- Latest start date (by calendar date)
- Latest finish date (by calendar date)
- Slack or float time (in workdays)

Computer printouts shall consist of at least a node sort and an "early start/total-float" sort.

B. Within 10 days after the Effective Date of the Contract, prepare and submit to the Engineer a practicable schedule showing the order in which the Contractor proposes to carry out the Work, the dates on which the important features of the work will start, and the contemplated dates for completing same. A time-scaled bar chart schedule shall include the following:

- Construction activities
- Submittal and review of critical material samples and shop drawings
- Procurement and delivery of critical materials
- Duration of work, including completion times of all stages and their sub-phases

C. Attention is drawn to typical local climatic weather patterns and Work shall be coordinated accordingly.

D. Complete Project schedule shall be revised and resubmitted to the Engineer at a minimum occurrence of every four (4) weeks for review.

2.2 BREAKDOWN OF CONTRACT PRICE

A. Within 10 days after the Effective Date of the Contract, submit a complete breakdown of all lump sum bid items showing the value assigned to each part of the work, including an allowance for profit and overhead adding up to the total lump sum contract price.

B. Breakdown of lump sum bids shall be coordinated with the items in the schedule and shall be in sufficient detail to serve as the basis for progress payments during construction.

C. Engineer will review the contract price breakdown and may request items to be further broken down or for more items be added in order to facilitate tracking of work progress for payment.

D. Preparatory work, bonds, and insurance required in setting up the job will be allowed as a separate entry on the cost breakdown but shall not exceed 5 percent of the total base bid.

E. Upon acceptance of the breakdown of the contract price by the Engineer, it shall be used as the basis for all requests for payment.

2.3 PRODUCT DATA

A. Product Data: Action Submittal: Submit to Engineer for review for assessing conformance with information given and design concept expressed in Contract Documents. Submitted data shall be sufficient in detail for determination of compliance with the Contract Documents.

B. Mark each copy to identify applicable products, models, options, and other data. Supplement Manufacturers' standard data to provide information specific to this Project.

1. Note submittal will be returned to Contractor without review of submittal if products, models, options, and other data are not clearly marked or identified.

C. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

D. After review, produce copies and distribute according to Paragraph 1.5.M and for record documents.

2.4 SHOP DRAWINGS

A. Shop Drawings: Action Submittal: Submit to Engineer for assessing conformance with information given and design concept expressed in Contract Documents.

B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. When required by individual Specification Sections, provide Shop Drawings signed and sealed by a professional Engineer licensed in the state of Project, responsible for designing components shown on Shop Drawings.

1. Include signed and sealed calculations to support design.

2. Submit Shop Drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.

3. Make revisions and provide additional information when required by authorities having jurisdiction.

D. All dimensioned shop drawings shall be scalable and provided as full-sized (22-inch x 34-inch) sheets. PDF electronic files shall print as scalable full-sized sheets.

E. After review, produce copies and distribute according to Paragraph 1.5.M and for record documents.

2.5 SAMPLES

A. Samples: Action Submittal: Submit to Engineer for assessing conformance with information given and design concept expressed in Contract Documents.

B. Samples for Selection as Specified in Product Sections:

1. Submit to Engineer for aesthetic, color, and finish selection.

2. Submit Samples of finishes, textures, and patterns for Owner selection.

C. Submit Samples to illustrate functional and aesthetic characteristics of products, with integral parts and attachment devices. Coordinate Sample submittals for interfacing work.

D. Include identification on each Sample, with full Project information.

E. Submit number of Samples specified in individual Specification Sections; Engineer will retain one Sample.

F. Reviewed Samples that may be used in the Work are indicated in individual Specification Sections.

G. Samples will not be used for testing purposes unless specifically stated in Specification Section.

H. After review, produce copies and distribute according to Paragraph 1.5.M and for record documents.

2.6 DESIGN DATA

A. Informational Submittal: Submit data for Engineer's knowledge as Contract administrator or for Owner.

B. Submit information for assessing conformance with information given and design concept expressed in Contract Documents.

2.7 TEST REPORTS

A. Informational Submittal: Submit reports for Engineer's knowledge and records as Contract administrator or for Owner.

B. Submit test reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

2.8 CERTIFICATES

A. Informational Submittal: Submit certification by Manufacturer, installation/application Subcontractor, or Contractor to Engineer, in quantities specified for Product Data.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or product but must be acceptable to Engineer.

2.9 MANUFACTURER'S INSTRUCTIONS

A. Informational Submittal: Submit Manufacturer's installation instructions for Engineer's knowledge as Contract administrator or for Owner.

B. Submit printed instructions for delivery, storage, assembly, installation, startup, adjusting, and finishing, to Engineer in quantities specified for Product Data.

C. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

2.10 MANUFACTURER'S FIELD REPORTS

A. Informational Submittal: Submit reports for Engineer's knowledge and records as Contract administrator or for Owner.

B. Submit report within 48 hours of observation to Engineer for information.

C. Submit reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

2.11 ERECTION DRAWINGS

A. Informational Submittal: Submit Drawings for Engineer's knowledge and records as Contract administrator or for Owner.

B. Submit Drawings for information assessing conformance with information given and design concept expressed in Contract Documents.

C. Data indicating inappropriate or unacceptable Work may be subject to action by Engineer or Owner.

1.1 PROJECT HEALTH AND SAFETY PROGRAM

D. Develop, publish, and implement an overall Project Health and Safety Program for the Project. This Program shall conform to all applicable codes. The written Safety Program shall be provided within 30 days after the receipt of the written Notice to Proceed. The Plan shall be assembled to address project specific health and safety issues to both the public and on-site personnel. The plan shall include at a minimum the following items when they apply:

1. Employee orientation
2. Safety inspections
3. Instruction and training
4. Accident reporting
5. Signs and barricades
6. Fire prevention and protection
7. Welding, cutting, and burning
8. Painting and surface treatment
9. Electricity
10. Machinery and mechanized equipment
11. Excavations
12. Sanitation
13. Chlorine safety
14. Hazardous materials
15. Hazardous communications program
16. Job hazard analysis

17. First aid/medical facilities
18. Personal protective equipment
19. Confined space entry plan
20. Shoring plan
21. Fall protection plan
22. Emergency Action Plan
23. Housekeeping
24. Safety training requirements and certification
25. Pedestrian access around work site during construction and after hours
26. Neighboring residences/community access and safety

E. If the Project requires other health and safety issues to be addressed, they too shall be included in the Project Health and Safety Program. The Program shall subsequently be distributed to and implemented by the Contractor's personnel, as well as its Subcontractors and Suppliers, the Owner and Engineer. Contractor shall fully implement and comply with the Safety Program and shall submit to the Owner a letter signed by Contractor's owner/president affirming such implementation and compliance within 15 days after on-site work has started. Contractor shall notify the Owner and Engineer when safety meetings will be held so that Owner's and Engineer's personnel may attend. A copy of the Health and Safety Program must be maintained on-site at all times during the life of the Project.

2.12 CONSTRUCTION PHOTOGRAPHS

A. Provide photographs of Site and construction throughout progress of Work produced by an experienced photographer acceptable to Engineer.

B. Each month submit photographs with Application for Payment.

C. Photographs: Can be in Electronic, PDF, or JPEG format.

D. Take four site photographs from different directions and four interior photographs of facilities indicating relative progress of the Work, two (2) days maximum before submitting.

E. Identify each photo in the electronic file name. Identify name of Project, phase, orientation of view, date, and time of view.

F. Digital Images: Deliver complete set of digital image electronic files on CD-ROM to Owner with Project record documents. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as sensor, uncropped.

1. Digital Images: Uncompressed TIFF format, produced by digital camera with minimum sensor size of 4.0 megapixels, and image resolution of not less than 1024 by 768 pixels.

2. Date and Time: Include date and time in filename for each image.

2.13 OPERATION AND MAINTENANCE (O&M) INSTRUCTIONS

A. Submit preliminary O&M materials for review by Engineer. The Equipment Manufacturer may furnish instruction manuals prepared specifically for the equipment furnished or standard manuals may be used if statements like "if your equipment has this accessory..." or listings of equipment not furnished are eliminated. O&M materials will be returned to the Contractor for

resubmittal if the O&M materials do not clearly indicate what specific equipment was furnished and all items not provided being clearly crossed out. Poorly reproduced copies are not acceptable. Operation and maintenance instructions shall contain the following as a minimum:

1. Reviewed shop drawings and submittal data;
2. Model, type, size, and serial numbers of equipment furnished;
3. Equipment and driver nameplate data;
4. List of parts showing replacement numbers;
5. Recommended list of spare parts;
6. Complete operating instructions including start-up, shutdown, adjustments, cleaning, etc.;
7. Maintenance and repair requirements including frequency and detailed instructions; and
8. Name, address and phone numbers of local representative and authorized repair service.

B. Following review of the preliminary O&M materials by the Engineer and before acceptance of the Work, submit four copies of complete final operation and maintenance instructions for all equipment supplied. Submit items in 8-1/2 x 11-inch heavy-duty three-ring binders when appropriate, or in 8-1/2 x 11-inch file folders. All binders and folders shall have clear plastic pockets on the front of the cover and the spine to allow for insertion of identifying information.

2.14 OTHER REQUIRED SUBMITTALS

A. Other required submittals include the items listed below. This list is provided for Contractor's convenience only and may not be complete in all respects. Contractor shall provide all submittals specified or required, whether or not listed here.

1. Contractor Emergency Contact List.
2. Erosion and Sediment Control Plan.
3. Traffic Control and Protection Plan.

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 45 00 - QUALITY CONTROL

PART 1 GENERAL

1.1 DESCRIPTION

A. This Section covers quality control requirements supplementary to those of the General Conditions and Technical Specifications.

1.2 PROVISIONS

A. Contractor's Responsibility for Testing

The Contractor shall be responsible for the cost of all testing as specified in this section. Additional information has been provided regarding the payment responsibility for the Owner with regards to the Project.

B. Owner's Right to Perform Additional Tests

The Owner or Engineer reserves the right to complete additional testing. In such cases, the Contractor shall provide safe access for the Owner or Engineer and their inspectors to adequately inspect the quality of work and the conformance with Project specifications.

1.3 QUALITY ASSURANCE

A. Testing Requirements

An independently owned and operated laboratory approved by the Engineer shall perform all testing as specified herein.

B. Testing

1. General

a. All required testing of work and/or materials shall be conducted in the presence of the Engineer. The Contractor shall provide 48-hour notification to the Owner and Owner's representative prior to conducting any and all quality assurance testing. Where applicable, work and materials shall only be buried with the consent of the Engineer.

b. Where such inspection and testing are to be conducted by an independent laboratory or agency, the sample, or samples of material to be tested shall be selected by such laboratory or agency or by the Engineer. The Contractor shall furnish such samples of all materials without charge to Owner.

c. The results from any and all tests are made for the information of the Owner. Regardless of any test results, the Contractor is solely responsible for the quality of workmanship and materials and for compliance with the requirements of the Drawings and Specifications.

2. Costs of Testing

a. The Contractor shall be responsible for and shall pay for all tests as specified in Part 3 of this Section. Additional information has been provided regarding the payment responsibility for the Owner with regards to the Project.

b. With regards to all materials to be tested, where test results demonstrate that the material or workmanship does not meet the minimum requirements of the Contract Documents, additional testing shall be completed and shall be paid for by the Contractor with no reimbursement by the Owner.

1.4 SPECIAL INSPECTIONS

NA

1.5 SUBMITTALS

A. Laboratory Test or Inspection Reports

Each report shall be signed and certified by the independently owned and operated testing laboratory. Unless otherwise specified, submit three copies of each report to the Owner or Owner's Representative.

PART 2 PRODUCTS – (Not Used)

PART 3 EXECUTION

3.1 FIELD TESTING SCHEDULE

A. NA.

END OF SECTION

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SUMMARY

A. Temporary construction facilities and control requirements for the Work include the following. Contractor responsible for providing all other temporary facilities and controls necessary to complete the Work as described in the Contract Documents.

1. Utilities including lighting and electricity, heat, telephone service, internet access and water.
2. Sanitary facilities.
3. Fire protection.
4. Roads.
5. Security fencing.
6. Enclosures.
7. Parking.
8. Traffic Control.
9. Owner’s access to facilities.
10. Field office for Contractor’s personnel.

B. Maintain temporary facilities in proper and safe condition throughout progress of Work.

C. Comply with federal, state, and local codes and regulations, and utility company requirements.

1.2 LAYOUT OF TEMPORARY FACILITIES

A. Before starting Work, submit to Owner, for approval, proposed layout of temporary facilities.

B. Should Contractor require space in addition to that shown on Drawings, Contractor shall make arrangements for storage of materials and equipment in locations off Site.

1.3 UTILITY PROPERTIES AND SERVICE

A. In areas where the Contractor’s operations are adjacent to or near a utility and such operations may cause damage which might result in significant expense, loss and inconvenience, the operations shall be suspended until all arrangements necessary for the protection thereof have been made by the Contractor.

B. The Contractor shall notify all utility offices which may be affected by the construction operation at least 48 hours in advance. Before exposing any utility, the utility having jurisdiction shall grant permission and may oversee the operation. Should service of any utility be

interrupted due to the Contractor's operation, the proper authority shall be notified immediately. It is of the utmost importance that the Contractor cooperates with the said authority in restoring the service as promptly as possible. Any costs shall be borne by the Contractor.

C. Contractor to contact one-number locator service (811) at least 48 hours in advance in advance of all excavations or other activities that may disturb and/or damage existing utilities. Existing utilities which may be impacted include the following.:

Potable Water, Storm Drain	City of Alcoa
Sanitary Sewer (on-site)	City of Alcoa
Non-potable water	City of Alcoa
Natural Gas	
Telephone/Data	
Power	

1.4 TEMPORARY LIGHTING AND ELECTRICITY

A. General:

1. Temporary lighting shall be sufficient to enable Contractor and Subcontractors to complete Work and enable Owner to observe Work. Illumination shall meet or exceed state code requirements.

B. Temporary electric power may be obtained from Owner's electrical system as follows:

1. Power is available at the site but may be limited. Power is available within existing structures but maybe significantly limited due to existing equipment and loads.

2. Make arrangements with Owner to review potential sources of temporary electricity and limitations of existing power supplies.

3. Based on review and potential sources, Contractor shall develop a layout of temporary electrical power for review by Owner.

4. Contractor is responsible to implement temporary power and provide electrical protection to prevent disruption of plant power from over-current, ground faults, and short circuits.

C. Temporary Electric Power:

1. Provide, maintain, and remove temporary electric service facilities.

2. Provide temporary electric systems and components in conformance with requirements of National Electric Code and local authorities.

3. Facilities exposed to weather shall be weatherproof type.

4. Enclosures shall be locked to prevent unauthorized access.

5. Provide lamps, wiring, switches, sockets, and similar equipment required for temporary lighting and power tools.

6. Provide electric service to temporary offices.

1.5 TEMPORARY HEAT

A. General:

1. Provide heating required for cold weather protection for all facilities.

2. Provide heating required after enclosure of structure.

3. Except as otherwise called for, temperature shall be kept above 50°F.

4. Heat shall be warm air from oil, electric or gas-fired portable heaters suitably vented to outside.

5. Open salamander type heaters are not permitted.

B. Temporary Heating:

1. Provide temporary heat, pay fuel costs, and maintain heating units.

2. Provide adequate heat to all parts of structure.

3. Repair or replace materials damaged because of lack of heat.

4. Provide throwaway filters if permanent system used for temporary heat.

5. If permanent system is used for temporary heat during construction, all system components shall be cleaned at completion of work, including ductwork.

1.6 PROJECT IDENTIFICATION

A. Project Identification Signs:

1. See Section 01 58 00 Project Sign, if required.

1.7 WATER FOR CONSTRUCTION AND TESTING

A. Contractor is responsible for making all arrangements necessary for temporary water for construction.

1. The Contractor shall furnish all valves, hoses, connections, and other devices as necessary to obtain sufficient water for construction and for filling and testing of water lines as required. Fire hydrant use is allowed only by permission of the utility owner.

2. Backflow protection is required on all connections to potable water systems.

1.8 SANITARY FACILITIES

A. Provide temporary sanitary facilities conforming to state and local regulations, in sufficient numbers for use of Contractor’s and Subcontractor’s employees.

B. Maintain in sanitary condition and properly supply with toilet paper.

1.9 TEMPORARY FIRE PROTECTION

A. Provide and maintain fire extinguishers and other fire protection equipment and devices as would be reasonably effective in extinguishing fires during early stages by personnel at Site.

1.10 TEMPORARY SITE AND OTHER ROADS

A. Maintain existing roads used during construction free from accumulation of dirt, mud, and construction debris.

B. Contractor shall repair or replace existing roads that remain to original or better condition prior to Final Completion. Survey and record condition of existing roads prior to construction.

1.11 CONTRACTOR'S WORK AREA

A. Work Area:

1. Limit construction operations and storage of equipment and materials to areas shown on Drawings and as determined by Owner.

2. Except as provided herein, no private property, or other area adjacent to Site shall be used for storage of Contractor's equipment and materials unless prior written approval is obtained from legal owner of the respective locations.

3. Contractor shall maintain staging areas during construction in a manner that will not obstruct operations of existing facilities. Work shall proceed in an orderly manner, maintaining construction Site and staging area free of debris and unnecessary equipment or materials.

B. Storage and Protection of Equipment and Materials:

1. The Contractor shall be solely responsible for the protection and security of all equipment and materials stored on the site. Equipment and materials stored at the site shall be placed neatly on the job site in an area and environment that will provide protection and security. Materials that are not adequately protected or stored in conformance with the Manufacturer's recommendations will be rejected. Unusable materials (i.e., rejected, or damaged liner material, old concrete chunks, metal scraps, etc.) shall be expeditiously removed from the job site.

2. Provide appropriate barricades, signs, and traffic control devices in like-new condition where necessary to protect the public and City employees from any hazards associated with the storage of materials and equipment used for this Project.

3. No equipment and/or materials shall be stored outside the immediate work area, in the following locations, or in the following manner:

a. In any maintained landscaped or lawn area.

b. In a manner that would totally eliminate an individual residents' street parking, or parking for the City's existing buildings.

c. In front of any business.

4. The “immediate work area” is the area where work is taking place or will be taking place within one calendar day. The Contractor shall immediately move stored material or equipment which causes a nuisance or creates complaints

1.12 SECURITY

A. The water treatment plant site is fenced. No other security will be provided by Owner.

B. Outside of the treatment plant is not fenced.

C. Contractor shall be responsible for loss or injury to persons or property where Work is involved and shall provide security and take precautionary measures to protect Contractor’s and Owner’s interests.

D. Provide and maintain temporary fencing of design and type needed to prevent entry into active construction areas.

1.13 ENCLOSURES

A. Provide and maintain all enclosures, scaffolds, tarpaulins, canopies, warning signs, steps, platforms, bridges, and other temporary construction necessary for proper completion of Work.

1.14 PARKING

A. Staging area and designated areas within construction limits may be used for parking of construction personnel’s private vehicles and Contractor’s lightweight vehicles. Parking shall not impede access or chemical deliveries to the water treatment plant facilities.

B. Make arrangements for additional parking off site as required.

C. No overnight parking, camping, or storage of personal vehicles, trailers or other items will be authorized.

1.15 TRAFFIC CONTROL AND PROTECTION

A. The Contractor shall maintain traffic control and protection in the work areas 24 hours per day. Traffic control shall conform to the requirements set forth by the Tennessee Department of Transportation as well as the standards set forth in the Manual on Uniform Traffic Control Devices (MUTCD) and local jurisdiction.

B. The Contractor shall conduct its operations so as to keep one lane of traffic open for public and private access at all times on City, County and Public streets, roads and highways. Permits obtained for the Project may have more stringent requirements than noted in this section.

C. Prior to beginning construction and as necessary or required by local or state agencies, the Contractor shall submit a detailed street closure and traffic control plan to the Owner for approval, which meets the requirements of the of the Tennessee State Department of Transportation. As construction proceeds, the Contractor shall notify the Owner as to the status of street closures and detours, if required.

D. All work shall be carried on with due regard for safety to the public. Open trenches shall be backfilled or covered with steel plates at the end of each day.

1.16 CONTRACTOR'S FIELD OFFICES AND BUILDINGS

A. If required by Contractor, erect where designated by Owner, and maintain temporary field office and tool and storage buildings for Contractor's use.

B. Buildings or trailers shall be neat and well-constructed, surfaced with plywood, siding, hardboard, or other similar material, well painted and void of advertisements.

1.17 ENGINEER'S FIELD OFFICE AND EQUIPMENT

N/A

PART 2 PRODUCTS - (Not Used)

PART 3 EXECUTION

3.1 GENERAL

A. Maintain and operate systems to ensure continuous service for duration of construction.

B. Modify and extend systems, as Work progress requires.

3.2 REMOVAL

A. Completely remove temporary materials, equipment, signs, and structures when no longer required.

B. In unfinished areas, clean and repair damaged caused by temporary installations or use of temporary facilities, restore drainage, and evenly grade, seed, or plant as necessary to provide appearance equal to or better than original.

C. In finished areas, restore existing or permanent facilities used for temporary services to specified, or original condition.

3.3 DAMAGE TO EXISTING PROPERTY

A. Contractor is responsible for replacing or repairing damage to existing buildings, structures, sidewalks, roads, parking areas, and other existing assets.

B. Contractor shall have option of having Owner contract for such Work and have cost deducted from Contract Price.

3.4 OWNER'S USE

A. Upon acceptance of Work, or portion of work defined and certified as Substantially Complete by Owner, and Owner commences full-time successful operation of facility or portion thereof, Owner will pay cost for utilities used for Owner's operation. Contractor shall continue to pay for utilities used until final acceptance of Work, except as provided herein.

END OF SECTION

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SECTION 01 66 00 - DELIVERY, STORAGE AND HANDLING

PART 1 GENERAL

1.1 GENERAL:

A. This Section specifies the general requirements for the delivery handling, storage and protection for all items required in the construction of the work. Specific requirements, if any, are specified with the related item.

1.2 TRANSPORTATION AND DELIVERY:

A. Transport and handle items in accordance with manufacturer's printed instructions.

B. Schedule delivery to reduce long term on-site storage prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the Engineer.

C. Ship equipment, material and spare parts complete except where partial disassembly is required by transportation regulations or for protection of components.

D. Pack spare parts in containers bearing labels clearly designating contents and pieces of equipment for which intended.

E. Deliver spare parts at same time as pertaining equipment. Deliver spare parts to owner after completion of work.

F. Coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged or sensitive to deterioration.

G. Deliver products to the site in manufacturer's original sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting and installing.

H. Assume responsibility for equipment material and spare parts just before unloading from carrier at site.

I. All items delivered to the site shall be unloaded and placed in a manner which will not hamper the Contractor's normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.

J. Provide equipment and personnel to unload all items delivered to the site.

K. Promptly inspect shipment to assure that products comply with requirements, quantities are correct, and items are undamaged.

L. Pay all demurrage charges if failed to promptly unload items.

1.3 STORAGE AND PROTECTION:

A. Store and protect products and equipment in accordance with the manufacturer's instructions, with seals and labels intact and legible. Instructions shall be carefully followed and a written record of this kept by the Contractor for each product and pieces of equipment.

B. Arrange storage of products and equipment to permit access for inspection. Periodically inspect to make sure products and equipment are undamaged and are maintained under specified conditions.

C. Provide protective maintenance during storage consisting of manually exercising equipment, inspecting mechanical surfaces for signs or corrosion or other damage, lubricating, applying any coatings as recommended by the equipment manufacturer necessary for its protection and all other precautions to assure proper protection of all equipment stored and for compliance with manufacturers' requirements related to warranties. Log all protective maintenance for each piece of equipment in the written record noted above.

D. Store loose granular materials on solid flat surface in a well-drained area. Prevent mixing with foreign matter.

E. Cement and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All structural, miscellaneous and reinforcing steel shall be stored off the ground or otherwise to prevent accumulation of dirt or grease, and in a position to prevent accumulations of standing water and to minimize rusting. Beams shall be stored with the webs vertical. Precast concrete shall be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping or cracking. Brick, block and similar masonry products shall be handled and stored in manner to reduce breakage, cracking and spalling to a minimum.

F. All mechanical and electrical equipment and instruments shall be covered with canvas and stored in a weathertight building to prevent injury. The building may be a temporary structure on the site or elsewhere, but it shall be satisfactory to the Engineer and Owner. Building shall be provided with adequate ventilation to prevent condensation. Maintain temperature and humidity within range required by manufacturer and to prevent condensation on the equipment being stored.

1. All equipment shall be stored fully lubricated with oil, grease and other lubricants unless otherwise instructed by the manufacturer.

2. Moving parts shall be rotated a minimum of once weekly to insure proper lubrication and to avoid metal-to-metal "welding". Log all rotation maintenance for each piece of equipment in the written record noted above.

3. Upon installation of the equipment, the Contractor shall start the equipment, at least half load, once weekly for an adequate period of time to ensure that the equipment does not deteriorate from lack of use. Log all startup for each piece of equipment in the written record noted above.

4. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. New lubricants shall be put into the equipment at the time of acceptance.

5. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guaranty the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.

6. Contractor shall assume responsibility for protection and storage of equipment and material.

PART 2 PRODUCTS - (Not Used)

PART 3 EXECUTION - (Not Used)

END OF SECTION

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SECTION 01 75 00 - TESTING, TRAINING, AND COMMISSIONING

PART 1 GENERAL

1.1 SCOPE

This section specifies equipment and system testing and start-up, services of Manufacturer's representatives, training of Owner's personnel, and final testing requirements for the complete facility.

The Contractor will be installing a new butterfly valve and electronic actuator for an existing sluice gate.

1.2 CONTRACT REQUIREMENTS

A. Testing, training, and start-up are requisite to the satisfactory completion of the Contract.

B. Complete all testing, training, and start-up within the Contract Time(s).

C. Furnish all necessary labor, power, chemicals, tools, equipment, instruments, and services required for and incidental to completing functional testing, performance testing, and operational testing.

D. Provide competent, experienced technical representatives of Equipment Manufacturers for assembly, installation, testing, and operator training.

1.3 START-UP PLAN

A. Submit start-up plan for each piece of equipment and each system not less than 2 weeks prior to planned initial equipment or system start-up.

B. Provide detailed Start-up Progress Schedule with the following activities identified:

1. Manufacturer’s services
2. Installation certifications
3. Operator training
4. Submission of operation and maintenance manual
5. Functional testing
6. Performance testing
7. Operational testing

C. Provide testing plan with test logs for each item of equipment and/or system. Include testing of alarms, control circuits, capacities, speeds, flows, pressures, vibrations, sound levels, and other parameters.

D. Provide summary of shutdown requirements for existing systems if required, which are necessary to complete start-up of new equipment and systems.

E. Revise and update start-up plan based upon review comments, actual progress, or to accommodate changes in the sequence of activities.

1.4 GENERAL START-UP AND TESTING PROCEDURES

A. Mechanical Systems:

1. Remove rust preventatives and oils applied to protect equipment during construction.

2. Flush lubrication systems and dispose of flushing oils. Recharge lubrication system with lubricant recommended by Manufacturer.

3. Flush fuel system and provide fuel for testing and start-up.

4. Install and adjust packing, mechanical seals, O-rings, and other seals. Replace defective seals.

5. Remove temporary supports, bracing, or other foreign objects installed to prevent damage during shipment, storage, and erection.

6. Check rotating machinery for correct direction of rotation and for freedom of moving parts before connecting driver.

7. Perform cold alignment and hot alignment to Manufacturer's tolerances.

8. Adjust V-belt tension and variable pitch sheaves.

9. Inspect hand and motorized valves for proper adjustment. Tighten packing glands to ensure no leakage but permit valve stems to rotate without galling. Verify valve seats are positioned for proper flow direction.

10. Tighten leaking flanges or replace flange gasket. Inspect screwed joints for leakage.

11. Install gratings, safety chains, handrails, shaft guards, and sidewalks prior to operational testing.

B. Electrical Systems

1. Perform insulation resistance tests on wiring except 120-volt lighting, wiring, and control wiring inside electrical panels.

2. Perform continuity tests on grounding systems.

3. Test and set switchgear and circuit breaker relays for proper operation.

4. Perform direct current high potential tests on all cables that will operate at more than 2,000 volts. Obtain services of independent testing lab to perform tests.

5. Check motors for actual full load amperage draw. Compare to nameplate value.

C. Instrumentation Systems

1. Bench or field calibrate instruments and make required adjustments and control point settings.

2. Leak test pneumatic controls and instrument air piping.

3. Energize transmitting and control signal systems, verify proper operation, ranges, and settings.

1.5 FUNCTIONAL TESTING

A. Functionally test mechanical and electrical equipment for proper operation after general start-up and testing tasks have been completed.

B. Demonstrate proper rotation, alignment, speed, flow, pressure, vibration, sound level, adjustments, and calibration. Perform initial checks in the presence of and with the assistance of the Manufacturer's representative.

C. Demonstrate proper operation of each instrument loop function including alarms, local and remote controls, instrumentation, and other equipment functions. Generate signals with test equipment to simulate operating conditions in each control mode.

D. Conduct continuous 8-hour test under full load conditions. Replace parts which operate improperly.

1.6 CERTIFICATE OF PROPER INSTALLATION

A. At completion of functional testing, furnish written report prepared and signed by Manufacturer's authorized representative, certifying equipment:

1. Has been properly installed, aligned, adjusted, and lubricated.

2. Is free of any stresses imposed by connecting piping or anchor bolts.

3. Is suitable for satisfactory full-time operation under full load conditions.

4. Operates within the allowable limits for vibration.

5. Controls, protective devices, instrumentation, and control panels furnished as part of the equipment package are properly installed, calibrated, and functioning.

6. Control logic for start-up, shutdown, sequencing, interlocks, and emergency shutdown has been tested and is properly functioning.

B. Furnish written report prepared and signed by the electrical and/or instrumentation subcontractor certifying:

1. Motor control logic that resides in motor control centers, control panels, and circuit boards furnished by the electrical and/or instrumentation subcontractor has been calibrated and tested and is properly operating.

2. Control logic for equipment start-up, shutdown, sequencing, interlocks, and emergency shutdown has been tested and is properly operating.

C. Co-sign the reports along with the Manufacturer's representative and subcontractors.

1.7 TRAINING OF OWNER'S PERSONNEL

A. Provide operations and maintenance training for items of mechanical, electrical, and instrumentation equipment. Utilize Manufacturer's representatives to conduct training sessions.

B. Coordinate training schedule with City staff. Coordinate training sessions to prevent overlapping sessions. Arrange sessions so that individual operators and maintenance technicians do not attend more than two sessions per week.

C. Provide Operation and Maintenance Manual for specific pieces of equipment or systems 2 weeks prior to training session for that piece of equipment or system.

D. Satisfactorily complete functional testing before beginning operator training.

E. The Owner may videotape the training for later use with the Owner's personnel.

1.8 MINIMUM SERVICE SCHEDULE

Minimum services as specified shall be provided in accordance with the following schedule:

Specification Section	Equipment	Minimum On-Site Time Requirements		
		1) Equipment Installation	2) Equipment Testing	3) Operator Training
40 05 57	Electric Actuator Operation and Controls	0.25 CWD	0.25CWD	0.5 CWD

NOTE: CWD is defined as a consecutive working day consisting of 8 hours each from 8:00 a.m. to 5:00 p.m.

1.9 OPERATIONAL TESTING

A. Conduct operational test of the entire facility after completion of operator training. Demonstrate satisfactory operation of equipment and systems in actual operation.

B. Immediately correct defects in material, workmanship, or equipment which became evident during operational test.

C. Repeat operational test when malfunctions or deficiencies cause shutdown or partial operation of the facility or results in performance that is less than specified.

1.10 RECORD KEEPING

A. Maintain and submit to Engineer the following records generated during start-up and testing phase of Project:

1. Daily logs of equipment testing identifying all tests conducted and outcome.

2. Logs of time spent by Manufacturer's representatives performing services on the job site.

3. Equipment lubrication records.
4. Electrical phase, voltage, and amperage measurements.
5. Insulation resistance measurements.
6. Pump torsional and lateral vibration analysis report.
7. Data sheets of control loop testing including testing and calibration of instrumentation devices and set points.

END OF SECTION

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SECTION 01 77 00 - CONTRACT CLOSEOUT

PART 1 GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY:

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.
6. Specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBMITTALS:

A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

B. Certified List of Incomplete Items: Final submittal at Final Completion.

C. Certification letter stating that all materials placed into the Work comply with the American Iron and Steel requirements per Section 746 of Title VII of the Consolidated Appropriations Act of 2017

D. Certificates of Release: From authorities having jurisdiction.

E. Certificate of Insurance: For continuing coverage.

F. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.4 SUBSTANTIAL COMPLETION PROCEDURES:

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.

3. Submit closeout submittals specified in the individual Specification Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

4. Submit maintenance material submittals specified in individual Divisions 02 through 46 Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Engineer. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Engineer’s signature for receipt of submittals.

5. Submit test/adjust/balance records.

6. Submit sustainable design submittals required in Division 01 sustainable design requirements Section and in individual Division 02 through 33 Sections.

7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.

2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner’s personnel of changeover in security provisions.

3. Complete startup and testing of systems and equipment.

4. Perform preventive maintenance on equipment used prior to Substantial Completion.

5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Division 01 Section "Demonstration and Training."

6. Advise Owner of changeover in heat and other utilities.

7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.

8. Remove labels that are not permanent labels.

9. Complete final cleaning requirements, including touchup painting.

10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Engineer, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

2. Results of completed inspection will form the basis of requirements for final completion.

1.5 SPARE PARTS AND MAINTENANCE PRODUCTS:

A. Furnish spare parts, maintenance, and extra products in quantities specified in individual specification sections.

B. Deliver to Project site and place in location as directed by Owner.

C. Coat parts to protect from moisture.

D. Crate in containers designed for prolonged storage suitable for handling with hoisting equipment containers: cardboard.

E. Stencil on containers:

1. Manufacturer/supplier name.
2. Unit name.
3. Spare part name.
4. Manufacturer catalogue number.
5. Other identifying information.
6. Precautionary information.

1.6 FINAL COMPLETION PROCEDURES:

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Division 01 Section "Measurement and Payment."

2. Certified List of Incomplete Items: Submit certified copy of Engineers' Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Engineer. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST):

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.

2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

3. Include the following information at the top of each page:

a. Project name.
b. Date.
c. Name of Engineer.
d. Name of Contractor.
e. Page number.

4. Submit list of incomplete items in the following format:

a. PDF electronic file. Engineer will return annotated file.

1.8 SUBMITTAL OF PROJECT WARRANTIES:

A. Time of Submittal: Submit written warranties on request of Engineer for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner’s rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.

2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.

3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 PRODUCTS - (Not Used)

PART 3 EXECUTION

3.1 FINAL CLEANING:

A. General: Perform final cleaning of construction site paths and roadways.

3.2 REPAIR OF THE WORK:

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, and refinishing damaged surfaces. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.

END OF SECTION

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SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.1 DESCRIPTION

A. This section includes procedural requirements for providing, compiling, and submitting operation and maintenance data required for this Project.

1.2 SUMMARY

A. This section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. General contents of data.
2. Specific data for each equipment and system.
3. Manual for materials and finishes.
4. Assembly.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

A. O&M Manual Content: Operations and maintenance manual submittal requirements are specified in individual Specification Sections for the Products for which they must be supplied. Submit reviewed manual content formatted and organized by this Section and as defined in Section 01 33 00.

1. Engineer will comment on whether content of operations and maintenance submittals are acceptable.

2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Manual Submittal: Submit an electronic copy of each manual in final form prior to requesting inspection for Substantial Completion and as defined in Section 01 33 00. Engineer will return an electronic copy with comments.

1. The Contractor to correct or revise each manual to comply with Engineer’s comments.

C. Submit one electronic and 3 hard copies of each corrected manual as a final manual within 15 days of receipt of Engineer's comments and prior to commencing startup, commissioning, and/or training.

D. After acceptance, deliver one electronic copy to the Engineer.

1.5 FORMAT (HARDCOPY)

A. Prepare data in the form of an O&M instructional manual.

B. Binders: Commercial quality, 8-1/2 x 11-inch three-hole post type binders with hardback, 3-inch maximum binder size. When multiple binders are used, correlate data into related consistent groupings. Three ring binders are not acceptable.

C. Arrange contents by Specification Section numbers and sequence of Table of Contents of this Project Manual.

D. Provide tabbed fly leaf for each separate product and system, with printed description of product and major component parts of equipment. Insert type tab labels must be secured or bonded to prevent the labels from falling out.

E. Text: Manufacturer's printed data, or typewritten data on 20-pound paper.

F. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages and insert into clear plastic envelopes that can be secured into the three-hole post binders.

1.6 FORMAT (ELECTRONIC DOCUMENTATION)

A. The Contractor must provide Operation and Maintenance Manual information specific to the configuration of the Project in electronic form that is substantively the same as that hard copy materials. Documents should be formatted like a web site complete with index page and Table of Contents. The electronic format must be such that the Owner is able to load the files onto a server to provide online access via any standard web browser. The Contractor shall make use of HTML (for text-based documents) and PDF (for CAD type drawings) file formats. The complete document shall be provided on a flash drive.

B. The electronic O&M data must be organized in a logical manner to aid operation in troubleshooting and information retrieval.

1.7 QUALITY ASSURANCE

A. Preparation of data shall be performed by personnel:

1. Trained and experienced in O&M of described equipment.

2. Familiar with requirements of this section.

3. Skilled as technical writers to the extent required to communicate the essential data to the Reader.

4. Skilled as drafters competent to prepare any required drawings.

1.8 SUPPLEMENTS

A. The supplements listed below, following "END OF SECTION" are part of this Specification.

1. 01 78 23A, Contractor Submittal Form

2. 01 78 23B, Equipment Data Form

PART 2 PRODUCTS - (Not Used)

PART 3 EXECUTION

3.1 GENERAL CONTENTS OF DATA

A. Each individual manual shall contain equipment data pertaining to not more than one Specification section number as indicated in the Contract Documents.

1. Completed Contractor Submittal Form (01 78 23A). See copy at the end of this section. An electronic copy of the form can be provided to the Contractor upon request

B. Title Sheet: First page in data listing following:

1. Title: “OPERATION AND MAINTENANCE INSTRUCTIONS”.

2. Title of Project: As shown on Contract Documents.

3. Name(s) of applicable building(s) or structure(s) in which equipment is located.

4. Name of equipment as described in Contract Documents.

5. Contractor’s name, address, and telephone number.

6. Subcontractor’s name, address, and telephone number if equipment is provided by Subcontractor.

7. Contractor’s or Subcontractor’s purchase order number, Manufacturer’s shop order number or other such numbers required for parts and service ordering.

8. Manufacturer’s name, address, and telephone number.

9. Name, address, and telephone number for local source of supply for parts and service.

C. Equipment List: Immediately following title sheet containing the following:

1. Table of Contents: Immediately following equipment list. Arrange in logical, systematic order and shall include as minimum each tabbed divider. Each page shall be numbered.

2. Tabbed Dividers: Insert tabbed section dividers between each major section

a. Provide title of section on each tab.
b. Provide table of contents for each tabbed section, arranged in systematic order.

3. Equipment Data Sheets: Provide catalog sheets showing configuration, Manufacturer’s specifications, models, options, and styles of equipment and major components being provided. Product data sheets will show project specific information with inapplicable information deleted by crossing out or removal. Include in tabbed section(s).

4. Text:

    a. Include only those sheets applicable to Project.

    b. Each sheet shall:

        1) Identify specific equipment or part installed.
        2) Identify text applicable to equipment or part installed.
        3) Do not include inapplicable information or neatly strike it out.

5. Drawings:

    a. Supplement text with drawings to clearly illustrate following:

        1) Equipment and components.
        2) Relations of component parts of equipment and systems.
        3) Control and flow diagrams.

    b. Actual drawings of equipment from Manufacturer. “Typical” drawings are not acceptable unless they accurately illustrate actual installation for this contract.

6. Specially written information, as required to supplement text for particular installation.

    a. Provide explanation of interrelationships of equipment and components, and effects one component has on another or entire system.

    b. Provide overall instructions and procedures for equipment tying in instructions and procedures for separate components into unified instructional package.

    c. Provide glossary of any special terms used by the Manufacturer if applicable.

    d. Organize in consistent format under separate headings for different O&M procedures.

    e. Provide logical sequence of instructions in order of O&M action required for each procedure.

3.2 SPECIFIC DATA FOR EACH ITEM AND/OR SYSTEM

A. For each item of equipment and system include:

1. Completed Equipment Data Form (01 78 23B). An electronic copy of the form can be provided to the Contractor upon request.

2. Description of equipment and component parts:

    a. Function

    b. Normal operating characteristics

    c. Limiting conditions.

    d. Performance curves

e. Engineering data

f. Test as applicable.

g. Complete nomenclature and model number of replaceable parts including keyed labeled exploded diagram.

h. Complete nameplate data.

i. Owner's tag (or asset) numbers for equipment as indicated on the Contract Drawings.

3. Operating Procedures:

a. Startup and break-in.
b. Normal operating instructions.
c. Regulation and control
d. Stopping and shutdown,
e. Emergency instructions.
f. Summer and winter operating instructions, as applicable.
g. Special operating instructions.

4. Maintenance Procedures:

a. Routine maintenance operations.
b. Guide to troubleshooting.
c. Disassembly, repair, and reassembly instructions.
d. Alignment, adjusting, and checking instructions.

5. Servicing and Lubrication Schedule:

a. List of lubricants required and quantity to be applied.
b. Schedule of lubrication.
c. Schedule for other routine maintenance.

6. Manufacturer's printed instructions regarding safety precautions for both (a) protection of personnel operating equipment and systems and (b) prevention of damage to equipment and systems.

7. Description of sequence of operation of controls.

8. Assembly drawings and diagrams required for maintenance.

9. Manufacturer's parts list and illustrations

a. Predicted life of parts subject to wear.
b. Items recommended to be stocked by the Owner as spare parts and quantities of same.

10. Accepted control diagrams such as ladder diagrams, instrumentation loop diagrams, and electrical schematics.

11. Bill of material.

12. Other data as required under applicable Specification sections.

B. Each electric and electronic system, as applicable to equipment such as switchgear, motor control centers, panel boards, switchboards, starters, breakers, and relays shall include:

1. Description of System and Component Parts:

    a. Function
    b. Normal operating characteristics
    c. Limiting conditions.
    d. Performance curves
    e. Engineering data
    f. Rating tables
    g. Tests, as applicable.
    h. Complete nomenclature and model number of replaceable parts.
    i. Complete nameplate data.
    j. Owner's Tag (asset) numbers for equipment as indicated on the Contract Drawings.

2. Circuit Directories of Panel Boards:

    a. Electrical service.
    b. Controls.
    c. Communications.

3. Complete instrumentation

    a. Loop diagrams
    b. Tabulated listing of components in each control circuit or loop.

4. Operating Procedures:

    a. Routine and normal operating instructions.
    b. Sequences required.
    c. Special operating instructions.

5. Maintenance Procedures:

    a. Routine maintenance operations.
    b. Guide to troubleshooting.
    c. Disassembly, repair, and reassembly instructions.
    d. Adjustment and checking instructions.

6. Manufacturer's printed instructions regarding safety precautions for both:

    a. Protection of personnel operating equipment and systems.
    b. Prevention of damage to equipment and systems.

7. List of original all of the Manufacturer's components, spare parts with diagram, and recommended quantities to be maintained in storage by the Owner.

8. Other data as required under pertinent sections of Specifications.

C. Prepare and include additional data when need for such data becomes apparent during instruction of Owner's personnel. Differences between the equipment O&M manual and the Manufacturer's training session shall result in the training and/or O&M Manual being corrected.

3.3 MANUAL FOR MATERIAL AND FINISHES

A. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Provide information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Include Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Additional Requirements: As specified in individual product specification sections.

E. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

3.4 ASSEMBLY

A. Assemble in 3 sets.

B. Remove bindings of individual manuals.

C. Insert index tabs labeled with the respective piece of equipment to separate individual manuals.

D. Provide a Table of Contents at the front of each volume showing the equipment items in the order in which they appear in the volume. Each equipment items shall include the functional name, applicable specifications section, and the plan listing, if any.

E. The preventive maintenance schedule shall be bound in the front of each section immediately following the index tab sheet. The schedule shall be identified with respect to the piece of equipment it is referring to.

F. Sheet Size: 8-1/2 x 11 sheets.

G. Drawings may be on 11 x 17-inch sheets folded to 8-1/2 x 11 inches.

H. Engrave on covers and end of binder, title OPERATIONS AND MAINTENANCE INSTRUCTIONS, name of Project, Owner's project number, date of Contract, and volume number with subject matter of contents, and Engineer's name.

END OF SECTION

01 78 23A	CONTRACTOR SUBMITTAL FORM		
TO: (Engineer) (Address) (City, State, Zip) (Attn:)		DATE:	
		SPECIFICATION SECTION TITLE:	
		SECTION NO.:	
		MANUFACTURER/ VENDOR:	
FROM: (Contractor) (Address) (City, State, Zip)		NO. OF COPIES SUBMITTED TO ENGINEEER:	
		SIGNATURE OF CONTRACTOR:	

GENTLEMEN:
We have checked the O&M manual submittal dated _____, 20__, and have found it to be in accordance with the requirements of Specification Section 01 78 23 as noted below.

FORMAT
Size: 8-1/2 x 11 or 11 x 17
Paper: 20-lb minimum
Text: Printed data/neatly typed
Drawings: Standard size bound in text; in text-size labeled envelopes
Tabbed Section Dividers
Cover Label: Title
Project name
Building/structure ID
Equipment name
Specification section
Binders: 3-ring

CONTRACTOR SUBMITTAL FORM			Page 2 of 5
Provided	Not Applicable	Page No.	
3.01 GENERAL CONTENTS			
			A. Section number - one specification only
			B. Title Page
			1. Title
			2. Project title
			3. Building/structure ID
			4. Equipment name
			5. Contractor ID
			6. Subcontractor ID
			7. Purchase order data
			8. Manufacturer ID
			9. Service/parts supplier ID
			C. Product List
			D. Table of Contents
			E. Tabbed Sections
			F. Pertinent data sheets
			1. Annotated as needed
			G. Text
			1. Pertinent to project
			2. Annotated
			H. Drawings
			1. Supplement text
			a. Illustrate product and components
			b. Relations of equipment systems
			c. Control and flow diagrams
			2. Actual drawing of project equipment

CONTRACTOR SUBMITTAL FORM			Page 3 of 5
Provided	Not Applicable	Page No.	
3.01 GENERAL CONTENTS			
			I. Special Information
			1. Interrelationships of equipment and components
			2. Instructions and procedures provided
			3. Instructions organized in consistent format
			4. Instructions in logical sequence
			5. Glossary
			J. Warranty, Bond, Service Contract
3.02 SPECIFIC CONTENTS (EQUIPMENT/SYSTEMS ONLY)			
			A. For each item of equipment
			1. Complete Form 2 to Section 01 78 23
			2. Description of Unit and Components
			a. Equipment functions
			b. Normal operating characteristics
			c. Limiting conditions
			d. Performance curves
			e. Engineering data
			f. Test data
			g. Replaceable parts list (with numbers)
			h. Nameplate data
			i. P&ID numbers
			3. Operating Procedures
			a. Startup, break-in
			b. Routine/normal operation
			c. Regulation and control
			d. Stopping and shutdown
			e. Emergency

Provided	Not Applicable	Page No.	
3.02 SPECIFIC CONTENTS (EQUIPMENT/SYSTEMS ONLY)			
			3. Operating Procedures (continued)
			f. Seasonal operation
			g. Special instructions
			4. Maintenance Procedures
			a. Routine/normal instructions
			b. Troubleshooting guide
			c. Disassembly/repair/assembly
			d. Alignment, adjusting and checking instructions
			5. Servicing and Lubrication
			a. List of lubricants
			b. Lubrication schedule
			c. Maintenance schedule
			6. Safety Precautions/Features
			7. Sequence of Operation of Controls
			8. Assembly Drawings
			9. Parts List and Illustrations
			a. Predicted life
			b. Spare parts list
			10. Control Diagrams/Schematics
			11. Bill of Materials
			12. Other Data as Required

Provided	Not Applicable	Page No.	
3.02 SPECIFIC CONTENTS (EQUIPMENT/SYSTEMS ONLY)			
			B. Each electrical and electronic system
			1. Description
			a. Equipment functions
			b. Normal operating characteristics
			c. Performance curves
			d. Engineering data
			e. Test data
			f. Replaceable parts list (with numbers)
			g. Nameplate data
			h. P&ID numbers
			2.Circuit and Panel Board Directories
			a. Electrical
			b. Controls
			c. Communications
			3. Instrumentation
			a. Loop Diagrams
			b. Components list each circuit/loop
			4. Operation Procedures
			a. Routine/normal operating instructions
			b. Sequences required
			c. Special operating instruction
			5. Maintenance Procedures
			a. Routine/normal instructions
			b. Troubleshooting guide
			c. Disassembly/reassembly
			d. Adjusting and checking
			6. Safety Precautions/Features
			7. Spare Parts List
			8. Additional Data

01 78 23B	EQUIPMENT DATA FORM			
PROJECT NAME				
CONTRACT NO.				
CONTRACTOR				
EQUIPMENT NO.			ASSET NO.*	
DESCRIPTION			MAINT. NO.*	
LOCATION				
MANUFACTURER				
PURCHASED FROM				
VENDOR ORDER NO.			PURCHASE $	
DATE OF PURCHASE				
LOCAL SUPPLIER				
ADDRESS				
PHONE NO.				
MODEL NO.				
NO. OF UNITS		SERIAL NOS.		
*By Owner				

NAMEPLATE DATA			
ELECTRIC MOTOR		PUMP/HVAC UNIT	
MANUFACTURER		MANUFACTURER	
TYPE	[ ] AC [ ] DC	TYPE	
HORSEPOWER		SIZE	
RPM		CAPACITY	
VOLTAGE		PRESSURE	
AMPERAGE		ROTATION	
PHASE		IMPELLER SIZE	
FRAME		IMPELLER MATERIAL	
DRIVE/REDUCER		OTHER (I&C)	
MANUFACTURER		MANUFACTURER	
TYPE	[ ] GEAR [ ] V-BELT [ ] CHAIN [ ] VARIDRIVE	TYPE	
		SIZE	
SERVICE FACTOR		CAPACITY	
RATIO		RANGE	

EQUIPMENT DATA FORM			Page 3 of 4
MAINTENANCE SUMMARY			
EQUIPMENT NO.		ASSET NO.*	
DESCRIPTION		MAINT. NO.*	
MAINTENANCE OPERATION:		FREQUENCY:	
List briefly each Maintenance Operation required and refer to specific information in Manufacturer's Manual, if applicable. Refer by symbol to "Lubricant List" for Lubrication Operation.		List required frequency of each maintenance operation.	
*By Owner			

EQUIPMENT DATA FORM			Page 4 of 4	
LUBRICANT/RECOMMENDED SPARE PARTS LIST				
EQUIPMENT NO.		ASSET NO.*		
DESCRIPTION		MAINT. NO.*		
LUBRICANT LIST				
REFERENCE SYMBOL	LUBRICANT TYPE (MILITARY STANDARD)	RECOMMENDED LUBRICANT AND MANUFACTURER		
List symbols in "Maintenance Operation" (Page 3).	List general lubricant type.	List specific lubricant name, viscosity, and Manufacturer.		
RECOMMENDED SPARE PARTS LIST				
PART NO. **	DESCRIPTION	UNIT	QUANTITY	UNIT COST
ADDITIONAL DATA AND REMARKS				
* By Owner ** Identify parts provided by this contract with two asterisks. Note: Attach additional sheets if necessary; identify each sheet at top with equipment number and description.				

SECTION 02 41 00 - DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of existing facilities.
2. Abandoning and removing utilities.

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Submit to Engineer a copy of written permission of private property owners, with copy of fill permit for said private property, as may be required for disposal of materials.

1.3 QUALITY ASSURANCE

A. Existing Conditions: Determine the extent of work required and limitations before proceeding with Work.

B. Conform to applicable local, state, and federal codes for environmental requirements in relation to disposal of debris.

1. Burning at the Site for the disposal of refuse, debris, and waste materials resulting from demolition and site clearing operations shall not be permitted.

C. Permits: The Contractor is responsible for obtaining all necessary permits required for completion of the Work described in this Section.

D. Protection of Persons and Property: Meet all federal, state, and local safety requirements for the protection of workmen, other persons, and property in the vicinity of the Work and requirements of the General Provisions.

E. If the existing material to be demolished and removed contains any hazardous materials which will require special handling upon removal, such as asbestos or lead, it is the responsibility of the Contractor to remove and dispose of the material in accordance with all applicable federal, state, and local regulations.

PART 2 PRODUCTS

2.1 MATERIALS

A. Existing Materials: All materials, equipment, miscellaneous items, and debris involved, occurring, or resulting from demolition, clearing, and grubbing work shall become the property of the Contractor at the place of origin, except as otherwise indicated in the Drawings or Specifications.

B. Crushed Rock: As specified in Section 31 05 16-2.1, Aggregates for Earthwork. Of the size shown in the Drawings or specified herein.

C. Sand: As specified in Section 31 05 16-2.2, Aggregates for Earthwork.

PART 3 EXECUTION

3.1 EXAMINATION

A. The Owner assumes no responsibility for the actual condition of the facilities to be demolished. The Contractor shall visit the site, inspect all facilities and be familiar with all existing conditions and utilities.

B. Demolition drawings identify major equipment and structures to be demolished only. Auxiliary utilities such as water, air, chemicals, drainage, lubrication oil, hydraulic power fluid, electrical wiring, controls, and instrumentation are not necessarily shown shall be considered incidental to all demolition work.

C. Identify waste and salvage areas for placing removed materials.

3.2 PREPARATION

A. Carefully coordinate the work of this Section with all other work and construction.

1. Call Tennessee 811, not less than three working days before performing Work.

2. Request underground utilities to be located and marked within and surrounding construction areas.

3. Disconnect or arrange for disconnection of utilities (if any) affected by required work.

4. Keep all active utilities intact and in continuous operations.

3.3 PROTECTION

A. Utilities: Locate, identify, and protect utilities located by utilities and indicated in the Drawings to remain from damage.

B. Survey control: Protect benchmarks, survey control points, and existing structures from damage or displacement.

C. Preservation and Trimming of Trees, Shrubs and Other Vegetation: As specified in Section 31 10 00, Site Clearing.

D. Landscaped Areas: Protect existing landscaped areas as specified in Section 31 10 00, Site Clearing.

E. Miscellaneous Site Features: Protect all existing miscellaneous site features from damage by excavating equipment and vehicular traffic, including but not limited to existing structures, fences, mailboxes, sidewalks, paving, guy wires, utility poles, and curbs.

F. Repair and Replacement:

1. Damaged items, including but not restricted to those noted above, shall be repaired, or replaced with new materials as required to restore damaged items or surfaces to a condition equal to and matching that existing prior to damage or start of Work of this contract.

2. Any damage to existing facilities or utilities to remain as caused by the Contractor's operations shall be repaired at the Contractor's expense.

3.4 DEMOLITIONS

A. Areas which are to be excavated for the purpose of demolition shall be cleared and stripped in accordance with Section 31 10 00, Site Clearing.

B. Carefully consider all bearing loads and capacities for placement of equipment and material on site. In the event of any questions as to whether an area to be loaded has adequate bearing capacity, consult with Engineer prior to the placement of such equipment or material.

C. Demolition of Existing Structures:

1. Excavate around existing structures as required to perform demolition operations and to plug associated existing pipelines where shown in the Drawing.

2. Provide shoring, bracing, and supports, as required, to ensure adjacent structures are not damaged and structural elements of existing structure are not overloaded during demolition activities.

a. Increase structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under any part of this Contract.

b. Remove all temporary protection when the Work is complete or when so authorized by the Engineer.

3. Any floors that are to remain in place shall be completely cracked through to allow for drainage. Cracking shall be accomplished by dropping a demolition ball or by other methods approved by the Engineer.

4. Remove and dispose of all exposed and/or protruding metalwork, piping, plumbing, and conduits resulting from demolition activities, and all woodwork, roofing, and electrical and mechanical equipment removed from demolished structures.

a. Reinforcing bars shall be cut flush with final wall elevations as shown in the Drawings.

b. No detached metalwork, excluding concrete reinforcing bars, shall be buried with the concrete and masonry rubble.

D. Backfill at Demolished Structures:

1. For structures designated to be abandoned and/or demolished in place, concrete and/or masonry rubble and excavated soils resulting from demolition activities shall be used for backfill or placed in the bottoms of said structures only as directed by the Engineer.

2. Concrete and masonry rubble used for backfilling shall be broken into pieces no larger than 12 inches on any one side.

3. Materials resulting from abandonment/demolition activities approved for backfill shall be combined with imported filler sand to create a dense, compacted backfill.

4. Backfilling or placement of the excavated material in the structures shall meet the following requirements.

    a. Furnish, place and compact filler sand along with the concrete and masonry rubble so that all voids are filled and a dense, compacted backfill is obtained.

    b. Filler sand shall be placed in horizontal layers completely filling all voids between pieces of rubble and not exceeding 12 inches in thickness.

    c. Each layer of filler sand shall be compacted to obtain at least 90 percent of maximum density as determined by ASTM Method D-698-78 (AASHTO T-99).

    d. Water shall be furnished by the Contractor and added to each layer as required to maintain optimum moisture content.

    e. The amount of filler sand used shall only be the amount needed to fill all voids created by placement of the concrete and asphalt rubble, as directed by the Engineer.

    f. At locations where concrete and masonry rubble are used for backfill, they shall be placed such that a minimum of 3 feet of compacted non-rubble backfill material (crushed rock) exists between any rubble and finished grade. Protruding reinforcing bars shall be cut to lengths that allow granular backfill to be placed and compacted to required levels in and above the rubble.

5. Disposal of all materials not used for backfill shall be performed off-site and in compliance with applicable local, state, and federal codes and requirements.

6. In areas where new construction will take place, no trace of these structures shall remain prior to placing of backfill.

E. Backfilling within the footprint of new structures with rubble material resulting from demolition activities will not be allowed.

F. All existing improvements designated in the Drawings or specified to be removed, including but not limited to structures, pipelines, walls, footings, foundations, slabs, pavements, curbs, fencing, and similar structures occurring above, at, or below existing ground surface shall be included in the demolition work.

G. Unless otherwise specified, any resulting voids shall be backfilled with suitable excavated or imported material compacted to the density of the adjacent soil.

3.5 EXISTING WATER UTILITY PIPING ABANDONMENT

A. As specified.

3.6 ELECTRICAL AND CONTROL SYSTEM DEMOLITION

A. All electrical and control system demolition work shall at all times be conducted in a safe and proper manner to avoid injury from electrical shock to all personnel.

1. Electrical equipment to be shut off for a period of time shall be tagged, locked out, and sealed with a crimped wire and lead seal and made inoperable.

2. At no time shall live electrical wiring or connections or those which can become energized be accessible to any persons without suitable protection or warning signs.

3.7 PERMANENT ABANDONMENT OF WELLS

A. The Contractor shall be responsible for securing and paying any local, state, or federal fees for abandonment of the well.

B. Abandonment of the well shall be performed by a licensed well constructor in the state in which the work is accomplished.

C. All work shall be performed according to federal, state, and local standards for permanent well abandonment.

3.8 ASPHALTIC CONCRETE DEMOLITION

A. Asphalt pavement shall be removed to the limits shown in the Drawings.
B. The limits of the removal shall be saw cut.
C. Asphalt pavement may not be used as rubble fill.

3.9 REMOVAL

A. Remove debris, rock, excavated materials, rubble, abandoned piping, and extracted plant life resulting from abandonment and/or demolition activities from site.

B. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site.

C. Removal: All material resulting from demolition, clearing, and grubbing, and trimming operations shall be removed from the Project Site and disposed of in a lawful manner. Materials placed on property of private property owners shall be by written permission only.

3.10 GRADING

A. All grading work shall be completed in accordance with rough grading provided on the plans.

3.11 CLEANUP

A. During and upon completion of work, promptly remove all unused tools and equipment, surplus materials, debris, and dust and shall leave all areas affected by the work in a clean, condition, as may be subject to Engineer approval.

B. Adjacent structures shall be cleaned of dust, dirt, and debris resulting from demolition.

C. Adjacent areas shall be returned to their existing condition prior to the start of work.

3.12 SCHEDULES

A. The following materials and items are to be demolished and removed from the Project Site:

1. 20” Butterfly valve, actuator, floor stand, handwheel, and extension stem.
2. Floor stand, manual actuator, extension stem and stem guides from sluice gate.
3. Coarse bar screen mounted on the exterior of intake pump station structure.
4. Other materials identified elsewhere on the plans and specifications.

END OF SECTION

SECTION 03 01 30 - CONCRETE REPAIRS

PART 1 GENERAL

1.1 SUMMARY

A. This specification describes the repair of concrete cracks, spalls, and other miscellaneous defects using an epoxy resin adhesive sealing system.

1.2 DEFINITIONS

A. Structural Defects: Concrete condition or characteristic that detracts from strength, life expectancy, or durability of concrete, or determined by the ENGINEER.

1. Structural defects may occur in the following areas:

a. Areas subject to structural loading.

b. Areas subject to heavy wear.

c. Interior of hydraulic structure.

d. Below grade structure.

e. Display defects or parts of defect that extend 1 inch or deeper into concrete and deemed by ENGINEER as structural defect.

1.3 SUBMITTALS

A. Product data sheets for each material supplied for horizontal, vertical, and overhead concrete repairs.

B. Drawings or photographs indicating location, size, estimated quantity, and proposed repair mortar for each repair location in new concrete.

C. Epoxy and/or Mortar Repair System:

1. Manufacturer’s preparation and installation instructions.

D. Written description of equipment proposed for hydrodemolition for surface preparation.

E. Certifications:

1. Manufacturer's Certificate of Compliance that proposed repair product system meets or exceeds specified performance criteria when tested in accordance with Article Field Quality Control.

F. Statements of Qualification:

1. Epoxy and/or Mortar system manufacturer's representative.

1.4 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. American Concrete Institute (ACI):

a. 503R, Use of Epoxy Compounds with Concrete.

2. ASTM International (ASTM):

a. C882, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.

b. D4258, Standard Practice for Surface Cleaning Concrete for Coating.

c. D4259, Standard Practice for Abrading Concrete.

3. International Concrete Repair Institute (ICRI):

a. 310.1R, Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion

b. 310.2, Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays

1.5 QUALITY ASSURANCE

A. Prior to purchasing repair materials or installing concrete repairs, the CONTRACTOR shall submit details for each proposed repair to the ENGINEER for review. The items to be included in the submittal shall include as a minimum the following items:

1. Repair location.

2. Methods to be used for removal of defective or unsound concrete.

3. Cleaning and surface condition just prior to repair material application.

4. Repair materials, installation, and curing.

5. Qualifications as listed below.

B. Qualifications:

1. Epoxy and/or Mortar System Applicator:

a. Experienced applicator endorsed by product/system manufacturer.

C. CONTRACTOR qualifications: CONTRACTOR shall be qualified in the field of concrete repair and protection with a successful track record of 5 years or more. CONTRACTOR shall maintain qualified personnel who have received product training by a manufacturer's representative.

D. Install materials in accordance with all safety and weather conditions required by manufacturer or as modified by applicable rules and regulations of local, state and federal authorities having jurisdiction. Consult Material Safety Data Sheets for complete handling recommendations.

1.6 PRE-REPAIR CONFERENCE

A. Required Meeting Attendees:

1. CONTRACTOR, including Contractor’s Quality Control Representative.

2. Repair Subcontractor.

3. Technical representative for repair material manufacturer.

4. ENGINEER.

5. Special Inspectors.

B. Schedule and conduct prior to incorporation of respective products into Project. Notify ENGINEER of location and time.

C. Agenda shall include:

1. Review of field conditions. Conduct field observations of Work to be performed.

2. Based on above observations, repair material manufacturer’s technical representative shall make material selection and repair method recommendations for horizontal, vertical, and overhead applications.

3. Technical representative for repair material manufacturer shall review proposed surface preparation, material application, consolidation, finishing, curing, and protection of repair material from weather conditions.

4. Other specified requirements requiring coordination.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Package products in moisture-resistant containers.

B. Deliver, store, and handle repair materials in accordance with manufacturer's printed instructions.

PART 2 MATERIALS & EQUIPMENT

2.1 ONE-COMPONENT, REPAIR MORTAR (VERTICAL AND OVERHEAD REPAIRS)

A. Polymer-modified, cementitious based, flowable, gray in color, horizontal and vertical surface repair mortar conforming to the following properties:

1. Minimum Slant Shear Bond Strength: 2,000 psi at 28 days in accordance in with ASTM C882 test method modified with no bonding agent.

2. Compressive Strength, ASTM C109/C109M at 28 days: minimum 4,500 psi.

3. Flexural Strength, ASTM C348 at 28 days: minimum 600 psi.

4. Splitting Tensile Strength, ASTM C496/C496M at 28 days: 400 psi minimum.

5. Shrinkage, ASTM C157 at 28 days: maximum 0.05 percent.

B. Manufacturers and Products:

1. For all locations: EUROREPAIR V100, Euclid Chemical Co. Cleveland, OH.

2. For Surface Repairs not in contact with Potable water: SIKAQUICK VOH, Sika Corp., Lyndhurst, NJ.

2.2 POLYMER-MODIFIED REPAIR MORTAR (VERTICAL AND OVERHEAD REPAIRS)

A. Polymer-modified, cementitious based, chloride resistant, flowable, gray in color, working time of 20 minutes minimum, surface renovation mortar conforming to the following properties:

1. Minimum Slant Shear Bond Strength: 2,000 psi at 28 days in accordance in with ASTM C882 test method modified with no bonding agent.

2. Compressive Strength, ASTM C109/C109M at 28 days: minimum 7,000 psi.

3. Flexural Strength, ASTM C348 at 28 days: minimum 1,200 psi.

4. Chloride Ion Penetrability Based on Charge Passed, ASTM C1202: 800 coulombs maximum.

5. Splitting Tensile Strength, ASTM C496/C496M at 28 days: 500 psi minimum.

6. Drying Shrinkage, ASTM C596 at 28 days: maximum 0.12 percent.

7. Freeze Thaw Resistance, ASTM C666/C666M, at 300 cycles: 90 percent RDF.

B. Manufacturers and Products:

1. For all locations: SIKATOP 123 PLUS, Sika Corp., Lyndhurst, NJ.

2. For Surface Repairs not in contact with Potable water: DURALTOP GEL, Euclid Chemical Co. Cleveland, OH.

2.3 POLYMER-MODIFIED REPAIR MORTAR (HORIZONTAL REPAIRS)

A. One-component, fast-setting conforming to the following properties:

1. Minimum Slant Shear Bond Strength: 2,000 psi at 28 days in accordance in with ASTM C882 test method modified with no bonding agent.

2. Compressive Strength, ASTM C109/C109M, 1 day, 2,500 psi; 7 days, 5,000 psi; 28 days, 7,000 psi minimums.

3. Flexural Strength, ASTM C348 at 28 days: minimum 1,500 psi.

4. Abrasion Resistance Depth of Wear, ASTM C779, Procedure A: 60 minutes, 0.033 inch.

5. Rapid Chloride Ion Penetrability Based on Charge Passed, ASTM C1202: 28 days, 850 coulombs maximum.

6. Splitting Tensile Strength, ASTM C496/C496M at 28 days: 600 psi minimum.

7. Drying Shrinkage, ASTM C157 Modified, at 28 days: maximum 0.09 percent.

B. Manufacturers and Products:

1. For all locations: SIKATOP 122 PLUS, Sika Corp., Lyndhurst, NJ.

2. For Surface Repairs Not In Contact with Potable Water: EMACO R310 CI, Building Systems (BASF), Shakopee, MN.

2.4 CEMENTITIOUS BONDING AGENT AND REINFORCEMENT COATING

A. Epoxy resin concrete cement adhesive, specifically formulated for bonding plastic portland cement concrete or mortar to hardened portland cement concrete.

1. Mixed Bonding Agent Properties:

a. Pot Life: 75 minutes to 105 minutes.

b. Contact Time: 24 hours.

c. Concrete Color: Gray.

2. Cured Epoxy Resin Portland Cement Adhesive Properties:

a. Splitting Tensile Strength, ASTM C496/C496M at 28 days: 600 psi minimum.

b. Flexural Strength, ASTM C348: 1,000 psi minimum.

c. Slant Shear Bond Strength, ASTM C882/C882M:

1) 2-hour Open Time: 2,500 psi minimum.

2) 24-hour Open Time: 2,000 psi minimum.

d. Bonding agent shall not produce a vapor barrier.

e. Compatible with mortar system.

B. Manufacturers and Products, for work not in contact with potable water:

1. MASTEREMACO P 124, Building Systems (BASF), Shakopee, MN.

2. SIKA ARMATEC-110 EPOCEM, Sika Corp., Lyndhurst, NJ.

3. DURALPREP A.C., Euclid Chemical Co. Cleveland, OH.

2.5 ANTI-CORROSION COATING

A. Three component, solvent free, moisture tolerant, epoxy modified, cementitious material.

B. Manufacturers and Products, for work not in contact with potable water:

1. SIKA ARMATEC-110 EPOCEM, Sika Corp., Lyndhurst, NJ

2. Or acceptable equivalent product.

2.6 CORROSION INHIBITING COATING

A. Penetrating, corrosion inhibiting, impregnation coating for hardened concrete.

B. Manufacturers and Products, for work not in contact with potable water:

1. SIKA FERROGARD-908, Sika Corp., Lyndhurst, NJ

2. Or acceptable equivalent product.

2.7 EPOXY BONDING AGENT

A. Epoxy bonding/grouting adhesive shall conform to ASTM C881 Type I, II, IV or V; Grade 2, Class C for epoxy resin adhesives, depending on the application. The class of epoxy bonding agent shall be suitable for all ambient and substrate temperatures.

B. Manufacturers and Products, for work not in contact with potable water:

1. SIKADUR-32 HI-MOD, Sika Corp., Lyndhurst, NJ

2. SIKADUR-32 HI-MOD LPL, Sika Corp., Lyndhurst, NJ

3. Or acceptable equivalent product.

2.8 EPOXY COATING AGENT

A. High-build, protective, solvent-free, colored epoxy coating for providing a protective lining.

B. Manufacturers and Products:

1. For all locations: SIKAGARD-62, Sika Corp., Lyndhurst, NJ

2. Or acceptable equivalent product.

2.9 FLEXIBLE CRACK REPAIR

A. Flexible crack repair shall be hydrophobic polyurethane suitable for crack grouting by injection.

B. Each location where flexible crack repair products are used must be approved in writing by the ENGINEER, prior to installation. Unless explicitly approved in writing by the ENGINEER, concrete crack repairs shall be per Specification 03 64 23, Crack Repair Epoxy Injection Grouting.

2.10 PROTECTIVE SLURRY MORTAR

A. Two-component, polymer-modified, cementitious waterproofing and protective slurry mortar for concrete.

B. Manufacturers and Products:

1. For all locations: SIKATOP SEAL-107, Sika Corp., Lyndhurst, NJ

2. Or acceptable equivalent product.

2.11 CONCRETE SEALER

A. Concrete sealer shall be a solvent-free, colorless, non-vapor-barrier sealer for absorbent cementitious surfaces that will not degrade under UV exposure.

B. Manufacturers and Products, for work not in contact with potable water:

1. SIKAGARD-701W, Sika Corp., Lyndhurst, NJ

2. Or acceptable equivalent product.

PART 3 EXECUTION

3.1 CONCRETE PREPARATION

A. Identify unsound and deteriorated concrete by sounding techniques and review proposed extent of repair with ENGINEER.

B. For patch areas 1/4 inch or deeper, follow ICRI 310.1R of ICRI 310.2.

C. Remove unsound, honeycombed, deteriorated, or otherwise defective concrete from work areas by saw cutting or 16,000 psi to 20,000 psi high-pressure water blasting machine capable of removing concrete surfaces to a minimum amplitude roughness of 3/16-inch roughness when measured with a straightedge, CSP 6-9 in accordance with ICRI 310.2, in accordance with ASTM D4259.

1. Remove all loose material up to 1 inch past any corroded reinforcing or corroded metal surfaces. Do not penetrate into concrete further than required to remove loose material.

2. Remove all dirt, oil, or other foreign material from the area of repair.

D. For concrete surface “rust bloom” abrasive based or abrasive blast surface back to “white metal” condition.

E. Do not use power-driven jackhammers and chipping hammers, unless water blasting is not practical or may cause other damage.

1. In such cases where chipping hammers are required, limit size of chipping hammer to reduce formation of microfracture of substrate concrete surface.

2. Following removal of unsound or deteriorated concrete, check substrate concrete surface by sounding techniques to identify unsound concrete remaining or resulting from use of chipping hammer.

3. Remove unsound concrete to satisfaction of ENGINEER.

F. To avoid tapered shoulders or featheredges, square edges of patch areas by sawing or chipping. Avoid cutting embedded reinforcing steel. Roughen polished saw-cut edge by high pressure water blasting or abrasive blasting.

G. Collect and dispose water from removal operations in manner and location acceptable to OWNER. Do not dispose via drainage or stormwater systems.

H. Inform ENGINEER if the following surface conditions exist:

1. 50 percent or more of reinforcing bar surface is exposed during removal of concrete.

2. 25 percent or more of reinforcing steel surface is exposed during removal of concrete and extent of reinforcing bar corrosion is such that more than 25 percent of material is lost.

3. Bond between existing concrete and reinforcement has deteriorated, as determined by ENGINEER.

I. Clean exposed reinforcing steel of rust to “white metal” and concrete per recommendations of repair material manufacturer and in accordance with ASTM D4258 and recommendations of ICRI 310.1R. Coat exposed reinforcing steel with appropriate repair product:

J. Replace deteriorated reinforcing with new reinforcing equivalent in cross-sectional area to original reinforcing. Weld new bars to existing reinforcement when and as directed by ENGINEER.

K. Keep areas from which concrete has been removed free of dirt, dust, and water blasting slurry. Remove laitance and other bond inhibiting contaminates from prepared areas.

3.2 FORMWORK AND SHORING

A. Execution of formwork and shoring must meet the requirements specified in Section 03 30 00 Cast-in-Place Concrete Work

B. Formwork

1. Construct forms to sizes, shapes, lines, and dimensions to match existing adjacent surfaces and textures. Provide forms that match openings, offsets, chamfers, anchorages, inserts and other features as described on Contract Documents. Construct forms to accommodate installation of products by other trades. Provide forms for easy removal to minimize damage to concrete surfaces and adjacent surfaces. Apply form release coating over formwork surfaces prior to each concrete placement. Form release agents must not be applied to or come in contact with the repair area concrete substrate or reinforcement.

2. Do not damage repair material during removal of formwork for columns, walls, sides of beams, and other parts not supporting weight of concrete or repair material. Perform needed repair and treatment required on vertical surfaces at once and follow immediately with specified curing. Remove all formwork anchors embedded in existing concrete. Fill anchor holes and repair all damage to existing concrete at anchor holes.

C. Shoring

1. Provide shoring in accordance with the shoring drawings prior to performing work to brace the substrate structure temporarily while repair work is proceeding. Shoring must be designed, documented, and stamped by a Licensed Design Professional. Shoring designs must be submitted to and approved by the ENGINEER prior to work commencing.

2. Leave formwork and shoring in place to support existing loads, construction loads and weight of repair material in beams, slabs, and other structural members until in-place strength of repair material determined in accordance with the Contract Documents. For post-tensioned construction, leave formwork and shoring in place until stressing is complete. When shores and other supports are arranged to allow removal of form-facing material without allowing structural slab or member to deflect, form-facing material and its horizontal supporting members may be removed at an earlier age.

3.3 CONCRETE REPAIRS

A. CRACK REPAIR

1. Preparation

a. General Requirements

1) Clean all cracks in accordance with the paragraph titled Concrete Preparation.

2) Do not repair cracks when the temperature of the concrete is below freezing and moisture conditions indicate the possibility of ice on the internal surfaces of the crack.

3) Do not apply adhesive if the temperature of the concrete is not within the range of application temperatures recommended by the manufacturer of the adhesive.

b. Crack routing

1) Inspect surfaces adjacent to crack to receive repair material. If deteriorated, route a V-groove section at the crack face until sound concrete is reached.

c. Sealing

1) For epoxy injection, apply a surface seal over all exterior faces of the crack that can be reached to contain the injection adhesive in the crack.

2) For gravity fill repairs, apply a surface seal along the bottom surface of the element that can be reached to contain the repair material in the crack.

2. Application

a. Epoxy Injection

1) Install the injection entry and venting ports using flush mounted or drilled fittings per proprietary manufacturer's instructions.

2) Space the ports at minimum of a distance equal to the thickness of the member or 8 in.

3) Inject the epoxy using material manufacturer's recommended equipment.

4) Apply recommended manufacturer's injection pressure.

5) For vertical or inclined cracks, apply injection by pumping epoxy into entry ports at the lowest elevation, cap, and move upward.

6) For horizontal cracks, apply injection by proceeding from one end of the crack to the other until the crack is fully sealed.

7) After 10 min., repeat injection procedure until all ports refuse injection.

8) Remove ports and remove the surface seal by heat, chipping, or grinding or other acceptable means after the injected epoxy has cured.

b. Gravity fill

1) Mix resin or monomer per material manufacturer's instructions.

2) Pre-fill cracks at least 0.125 in. wide with aggregate.

3) Pour resin or monomer onto the surface, over the cracks and spread with brooms, rollers, or squeegees.

4) Work material back and forth over the cracks to maximize fill in crack.

5) Allow at least 20 minutes for material to penetrate cracks (confirm time based on manufacturer’s product).

6) Remove excess material once cracks have been filled to refusal.

7) Allow material to cure per material manufacturer's recommendations.

8) Remove sealant and grind smooth.

3. Quality Control

a. Conduct quality and control tests for metering accuracy and mixing effectiveness of the continuous mixing pump in accordance with ACI 503.7.

b. Qualify the test injection procedures in accordance with ACI 503.7.

4. Acceptance Criteria

a. Core Sampling

1) Core sampling

a) Not required for crack lengths under 5ft in length.

b) Confirm with ENGINEER is core sampling required for crack lengths between 6ft and 30ft.

c) For 30ft or greater obtain 1 core and up to three cores from first 100 ft. and one core for each 100 ft. thereafter.

2) Obtain core samples in accordance with ASTM C42/C42M.

3) Allow 24 hours after injection before coring.

4) Obtain cores in a manner that includes as much of the bond line of the repaired concrete as possible. Replace cores that do not intersect the crack for at least 75 percent of the length of the core.

5) If cores would sever reinforcing steel or other embedded items, do not core, and notify the ENGINEER so that an alternative location can be chosen.

6) Obtain cores at least 2 in. in diameter for visual inspections and at least 4 in. in diameter for the splitting tensile test. Perform a splitting tensile test on one core from the first 100 ft. and one core for each 250 ft. thereafter.

7) Fill core holes with non-shrink grout Pre-treat hole with bonding agent before grouting.

b. Core Testing

1) Test a portion of the core samples for the splitting tensile strength in accordance with ASTM C496/C496M.

2) Allow 72 hours after injection before beginning splitting tensile tests

3) Prepare core sample per ASTM C42/C42M.

4) Align the core so that the crack is in a plane as close to vertical as possible.

c. Acceptance

1) Work is acceptable if at least 90 percent of the depth of the crack in each core is filled with adhesive.

B. CORROSION, SPALLING, AND GENERAL SURFACE REPAIR

1. Preparation

a. Identification of Extent of Concrete Removal

1) Configure geometry of removal area to maximize the use of right-angle geometry, avoiding reentrant corners, and to obtain uniformity of depth. Determine the depth, location, and size of reinforcing bars prior to removal of concrete.

2) Perform visual inspection and hammer tapping, chain drag sounding, or other methods acceptable by the ENGINEER to identify cracked, delaminated, spalled, disintegrated, and otherwise unsound concrete for removal. Mark boundaries of repair area before concrete removal.

3) Inspect the marked boundaries with the ENGINEER prior to commencing with the concrete removal. Revise the repair area boundaries as instructed by the ENGINEER.

b. Shoring and Formwork

1) Provide shoring and formwork per the paragraph titled Formwork and Shoring.

2) For post-tensioned concrete, detension strands and wires as required by Contract Documents prior to repair.

c. Concrete Removal

1) Remove concrete from repair areas to indicated depth and profile. Notify ENGINEER if additional delaminated, fractured, or unsound concrete is present.

2) Do not damage embedded reinforcing and adjacent concrete. The removal methods must produce minimal microcracking (bruising) of the prepared substrate surfaces.

Avoid directly striking reinforcing steel with impact tools used for concrete removal.

3) Provide perpendicular edges at perimeter of repair area. The perimeter of the repair areas must be saw cut to a depth of 0.50 to 0.75 in. For vertical or overhead surfaces, provide 45-degree slope at repair boundaries to facilitate air and rebound escape. Do not cut or damage embedded reinforcement or other embedded items. If embedded reinforcing steel or other embedded items are too close to the surface to provide the perpendicular edge cut, notify the ENGINEER for direction before proceeding.

4) Extend concrete removal along the corroded reinforcing steel to a point where there is no further delamination, concrete cracking, or reinforcing steel corrosion, and where the reinforcement is bonded to the surrounding concrete.

5) Remove concrete around the exposed layer of reinforcement to a uniform depth beyond within the repair areas to provide a minimum clearance between exposed reinforcing steel and surrounding concrete of 0.75 in., or at least 0.25 in. larger than the maximum nominal size of the coarse aggregate in the repair material.

d. Preparation of Concrete Substrate Surface

1) Confirm perpendicular edges at repair area perimeter, and reinstate if damaged by concrete removal process. Remove loosely bonded concrete, bruised or fractured concrete, and bond-inhibiting materials such as dirt, concrete slurry, or any other detrimental materials from the concrete substrate using approved methods. Where concrete has been removed by impact methods, abrasive blasting must be used to prepare the surface and remove bruised concrete.

2) Provide substrate surface profiles as specified in the Contract Documents.

3) Visually inspect and sound substrate surface to confirm that no further delaminations or otherwise unsound concrete remains. If encountered, notify the ENGINEER.

4) Clean the substrate per the paragraph titled Concrete preparation.

2. Application

a. Existing Reinforcement Preparation

1) Clean existing reinforcement that will remain. Remove corrosion and/or other laitance and notify the ENGINEER if section loss is greater than 20%.

2) If applicable, replace coating on reinforcement per ASTM A780 (galvanized bar), ASTM A775 (epoxy coated bar), or ASTM A934 (epoxy coated bar). Exposed areas must not exceed 2 percent of surface area in each linear foot of each bar.]

3) Permit evaluation of existing reinforcement and placement of new reinforcement by the ENGINEER.

b. Placement of New Reinforcement

1) Placement of new reinforcement to replace or strengthen existing reinforcement is like new construction. Placement, splicing, and handling of new reinforcement must meet the requirements specified in Section 03 30 00 Cast-in-Place Concrete Work.

2) Reinforcement must be free of materials deleterious to bond. New reinforcement with rust, mill scale, or a combination of both will be considered satisfactory, provided minimum nominal dimensions, nominal weight, and minimum average height of deformations of a hand-wire-brushed test specimen are not less than applicable ASTM specification requirements.

c. Placement of Concrete

1) If portland cement concrete is used as the repair material, follow the requirements indicated in 03 30 00 Cast-in-Place Concrete Work as well the Contract Document for proportioning, mixing, and placing concrete. For all other materials, follow material manufacturer's recommendations.

2) A bonding agent must be used.

3) Apply corrosion inhibitors to rebar in repair area.

4) Consolidate the repair material after placement with a vibrating screed or internal vibrator.

5) Finish the surface to match surface finish and texture requirements indicated in the Contract Document. Screed, float and trowel the repair material or broom the surface for non-slip texture. Follow the requirements of 03 30 00 Cast-in-Place Concrete Work.

d. Placement of Other Repair Materials

1) Equilibrate repair material(s) and substrate to the temperature, cleanliness of substrate and reinforcement, and moisture requirements of the repair material manufacturer's requirements.

2) Comply with the repair material manufacturer's requirements for batching, mixing, placing and curing repair materials.

3) Review consistency of the mixed repair material(s) relative to the parameters documented in the repair material manufacturer product data sheet. If non-conforming, adjust consistency in compliance with the repair material manufacturer's requirements.

4) Apply or install repair material(s) within the application time frame (pot life) requirements of the repair material manufacturer's requirements, and place and consolidate to provide well-compacted repair.

5) Finish and tool repair materials, finished in accordance with the repair material manufacturer's written instructions and as indicated in Contract Documents.

6) Protect installed repair material(s) from damage, exposure to environmental conditions that are detrimental to the uncured or cured properties of the material. Cure in accordance with the requirements of the repair material manufacturer's requirements.

3. Quality Control

a. Protect concrete surfaces, beyond limits of surfaces receiving bonding agent adhesive, against spillage. Immediately remove any bonding agent adhesive that has spilled beyond desired area.

Perform cleanup with material designated by bonding agent adhesive manufacturer. Avoid contamination of work area.

b. The bond strength between the existing concrete and the repair material must be a minimum of 250 psi per ASTM C1583. Test a minimum of 3 specimens at locations no greater than 500 square yards of prepared surface.

3.4 PROTECTION

A. Protect adjacent surfaces from over application of bonding agent. Promptly remove bonding agent applied beyond repair area.

B. Protect adjacent surfaces, and equipment, from being damaged by overshooting, rebound, and dust, as applicable for repair mortar system used, from shotcrete mortar or low- pressure spray mortar.

3.5 TESTS AND INSPECTIONS:

A. Special Inspection, Testing, and Professional Observation shall be provided by the OWNER.

B. See Section 3.3 Concrete Repairs for individual repair method's Testing Requirements.

3.6 FIELD QUALITY CONTROL

A. Sounding for Hollow Areas:

1. See Section 3.3 Concrete Repairs for Inspection and Testing.

2. Where lab testing is not required, light hammer tap repaired areas listening for hollow sound to determine areas that have not properly bonded to substrate concrete.

3. Mark hollow areas for removal and replacement.

4. Saw cut hollow sounding areas to a new square edge, and reapply mortar as specified.

B. Remove and replace unacceptable Work.

3.7 CLEANING

A. Remove overshot mortar and rebound materials as Work proceeds. Remove from Work waste materials, unsound material from concrete surfaces, material chipped from walls, and water used in preparation of application and finishing.

END OF SECTION

SECTION 03 60 00 - GROUTING

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes all work necessary to form, mix, place, cure, repair, finish, and perform all other work as required to produce finished grout, in accordance with the requirements of the Contract Documents.

B. Work covered in this Section includes:

1. Patching, grouting, and sealing.
2. Grouting of metal door frames
3. Grouting for support of plumbing, fire sprinklers, and HVAC equipment
4. Grout for support of mechanical, electrical, and communications equipment
5. Removal of loose and spalling grout and concrete.

1.2 SUBMITTALS

A. Manufacturer Technical Data and Strength Test Results: For sack-mix grouts used on minor-structure/systems provide datasheet information verifying the compressive strength, shrinkage, and expansion requirements specified herein for grout used.

B. Manufacturer's Literature: Containing instructions and recommendations on the mixing, handling, placement, and appropriate uses for each type of non-shrink and epoxy grout used in the work.

1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Specifications, codes, and standards shall be as specified in Section 03 30 00, Cast-in-Place Concrete Work and as referred to herein.

Comply with the provisions of the following codes, specifications, and standards, except as otherwise shown or specified.

B. Codes and Standards

1. American Society for Testing and Materials (ASTM)

a. C1084, “Standard Test Method for Portland-Cement Content of Hardened Hydraulic-Cement Concrete”

b. C109, “Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-inch or 50-mm Cube Specimens)”

c. C191, “Standard Test Method for Setting Time of Hydraulic Cement”

d. C131, “Standard Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine”

e. C136, “Standard Test Method for Sieve Analysis to Fine and Coarse Aggregate”

f. C143, “Standard Test Method for Slump of Hydraulic Cement Concrete”

g. C150, “Standard Specification for Portland Cement”

h. C488, “Standard Test Method for Pull-Out Strength”

i. C531, “Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes”

j. C579, “Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes”

k. C827, “Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures”

l. C827, “Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures”

m. C882, “Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear”

n. C939, “Standard Test Method for Flow of Grout for Preplaced – Aggregate Concrete (Flow Cone Method)”

o. C942, Standard Test Method for Compressive Strength of Grouts for Preplaced-Aggregate Concrete in the Laboratory “”

p. C1090, “Standard Test Method for Measuring Changes in Height of Cylindrical Specimens from Hydraulic Cement Grout”

q. C1107, “Standard Test Method for Packaged Dry, Hydraulic Cement Grout (Non-Shrink)”

r. C1437, “Standard Test Method for Flow of Hydraulic Cement Mortar”

s. E488, “Standard Test Method for Strength of Anchors in Concrete and Masonry Elements”

2. American Concrete Institute (ACI)

a. “Guide to Hot Weather Concreting”, ACI 305R.

b. “Guide to Cold Weather Concreting”, ACI 306R.

c. “Guide for Selecting and Specifying Materials for Repair of Concrete Surfaces”, ACI 320.2R, as supplemented and modified herein.

3. CRD-C 621, Corps of Engineers Specification for Non-Shrink Grout

1.4 DELIVERY HANDLING AND STORAGE

A. Deliver products in original packaging, labeled with product identification, manufacturer, batch number and shelf life.

B. Handle products in accordance with manufacturer’s printed recommendations. Do not place grout when temperature or humidity will affect the performance or appearance of the grout.

C. Store products in a dry area. Protect from direct sunlight.

D. Do not place grout on dirty, wet, or frozen substrates.

PART 2 PRODUCTS

2.1 PREPACKAGED GROUTS

A. High Strength Non-shrink grout: This type of grout is to be used wherever grout is required in the Contract Documents unless another type is specifically referenced.

1. High Strength Non-shrink grout shall be a prepackaged, inorganic, non-gas-liberating, non-metallic, cement-based grout requiring only the addition of water. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation of each type of non-shrink grout specified herein shall be that recommended by the manufacturer for the particular application.

Early Height Change, ASTM C827	0.0 to +0.3%		
Hardened Height Change, ASTM C1090	+0.2 to +0.4%		
Effective Bearing Area	95%		
Compressive Strength, ASTM C942	Plastic	Flowable	Fluid
1 Day (min.)	1,000 psi	1,000 psi	1,000 psi

28 Days (min.)	5,000psi	5,000psi	5,000psi
Bond Strength, ASTM C882			
28 Days	2000psi		
Application Temperature	40°F to 90°F		
Material Temperature	40°F to 90°F		

B. Application

1. High Strength Non-shrink grout shall be used for the repair of all holes and defects in concrete members which are water bearing or in contact with soil or other fill material, grouting under and all equipment base plates, and at all locations where grout is specified in the contract documents.

2.2 CONSISTENCY

A. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is such that the grout is plastic and moldable but will not flow. Where “dry pack” is called for in the Contract Documents, it shall mean a grout of that consistency; the type of grout to be used shall be as specified herein for the particular application.

B. The slump for topping grout and concrete fill shall be adjusted to match placement and finishing conditions but shall not exceed four (4) inches.

2.3 MEASUREMENT OF INGREDIENTS

A. Measurements for cement grout shall be made accurately by volume using containers approved by the ENGINEER. Shovel measurement shall not be allowed.

B. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

PART 3 EXECUTION

3.1 GENERAL

A. All surface preparation, curing, and protection of cement grout shall be as specified by the manufacturer. The finish of the grout surface shall match that of the adjacent concrete.

B. Base concrete or masonry must have attained its design strength before grout is placed, unless authorized by the ENGINEER.

3.2 GROUTING PROCEDURES

Prepackage Grouts: All mixing, surface preparation, handling, placing, consolidation, curing, and other means of execution of prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.

3.3 Installation

A. Examination

1. Examine substrates and conditions under which materials will be installed. Do not proceed with Installation until unsatisfactory conditions are corrected.

2. Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas landscaping from contact due to mixing and handling of materials.

B. Surface Preparation

Comply with manufacturer's printed instructions and the following:

1. Mechanically remove all unsound concrete to the limits indicated on the drawings. Remove cement paste and laitance to expose sound aggregate.

2. Clean surface to receive grout of all materials including dust, oil, dirt, and grease or Efflorescence.

3. Dampen with clean water before patching and remove standing water.

C. Specialized Installation Requirements

1. Grout Below Bearing Plates:

a. Support bearing plates above cleaned bearing surfaces with double-nutted anchor bolts or wedges.

b. Fill space below bearing plates supporting structural members and stationary equipment with non-metallic non shrink grout.

c. Fill space below bearing plates supporting vibrating equipment with metallic non shrink grout.

2. Grout in Steel Door Frames: Install non-metallic non shrink grout between masonry rough opening and door frames in masonry walls, fully filling frames with grout.

D. Formwork:

1. Comply with manufacturer's printed instructions and the following:

    a. Forms must be watertight, strong, properly braced, and properly coated.

    b. Allow a minimum clearance of 2 inches between forms and baseplate for grout entry.

    c. Allow a minimum grout head of 6 inches.

    d. Slope form on placing side to assist in grout movement and to prevent trapping air.

    e. Allow 1-inch horizontal clearance and 1-inch vertical clearance for height above bottom of baseplate.

    f. Provide venting of forms to avoid entrapment of air.

E. Mixing Requirements:

1. Comply with manufacturer's printed instructions and the following:

    a. Do not re-temper with additional water.

F. Placement of Grout Materials:

1. Comply with manufacturer's printed instructions and the following:

    a. The area to be grouted should be thoroughly flushed and soaked with clean water prior to grouting. Leave no standing water.

    b. Place the grout quickly and continuously use light rodding or strapping to eliminate air bubbles.

    c. Place grout mixture into prepared areas from one side or the other, rapidly and continuously, to reduce air entrapment. Avoid placing grout from opposite sides.

    d. Grout temperature should be maintained from 50°F to 90°F to achieve specified results. Use cold water in hot weather or hot water in cold weather to achieve desired grout temperature. Do not use if temperature is expected to go below 32°F within a 12-hour period.

G. Curing Requirements:

1. Utilize a damp cure of at least 3 days is necessary to control the Non-Shrink characteristics and maintain strength levels.

2. Cover fresh grout and anchoring cement with plywood where exposed to construction traffic for 24 hours minimum.

H. Cleaning After Grout Placement

1. Remove excess material before material cures. If material has been cured, remove using mechanical methods that will not damage substrate.

3.4 Completion

A. Adjusting Defective Work: Replace or patch grout and anchoring cement as directed by OWNER/ENGINEER.

END OF SECTION

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 GENERAL

1.1 SUMMARY

A. The extent of metal fabrications work is shown on the Drawings and includes items fabricated from iron, steel, stainless steel and aluminum shapes, plates, bars, sheets, strips, tubes, pipes, and castings which are not a part of structural steel or other metal systems in other sections of these specifications.

B. Section Includes:

1. Shop-fabricated metal items.
2. Coarse Bar Screen
3. Screen Deflector
4. Anchor bolts.
5. Wall brackets
6. Miscellaneous fabrications, framing, and supports.

1.2 REFERENCE STANDARDS

A. Aluminum Association:

1. AA DAF-45 - Designation System for Aluminum Finishes.

B. American Architectural Manufacturers Association:

1. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.

2. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.

3. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.

4. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

C. American National Standards Institute:

1. ANSI A14.3 - American National Standard (ASC) for Ladders - Fixed - Safety Requirements.

D. American Welding Society:

1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.

2. AWS D1.1 - Structural Welding Code - Steel.

3. AWS D1.6 - Structural Welding Code - Stainless Steel.

E. ASTM International:

1. ASTM A6 - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.

2. ASTM A36 - Standard Specification for Carbon Structural Steel.

3. ASTM A47, grade as selected - Malleable Iron Castings.

4. ASTM A48, Class 30 - Gray Iron Castings.

5. ASTM A53- Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

6. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished

7. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

8. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

9. ASTM A193 - Standard Specification for Alloy-Steel and Stainless-Steel Bolting for High Temperature or High-Pressure Service and Other Special Purpose Applications.

10. ASTM A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

11. ASTM A269 - Standard Specification for Seamless and Welded Austenitic Stainless-Steel Tubing for General Service.

12. ASTM A283, Grade C - Steel Plates to be Bent or Cold Formed.

13. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes.

14. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.

15. ASTM A312 - Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless-Steel Pipes.

16. ASTM A354 - Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners.

17. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

18. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

19. ASTM A513 - Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.

20. ASTM A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing.

21. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.

22. ASTM A572 - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.

23. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

24. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless-Steel Sheet, Strip, Plate, and Flat Bar.

25. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

26. ASTM A992 - Standard Specification for Structural Steel Shapes.

27. ASTM B26 - Standard Specification for Aluminum-Alloy Sand Castings.

28. ASTM B85 - Standard Specification for Aluminum-Alloy Die Castings.

29. ASTM B177 - Standard Guide for Engineering Chromium Electroplating.

30. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

31. ASTM B210 - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes.

32. ASTM B211 - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire.

33. ASTM B 308, Alloy 6061-T6, Anodic Coating Class I, AA-C22-A41, anodized after fabrication - Structural Aluminum Shapes and Plates.

34. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

35. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.

36. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.

37. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings.

38. ASTM F3125 - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi and 150 ksi Minimum Tensile Strength.

39. ASTM F436 - Standard Specification for Hardened Steel Washers.

40. ASTM F844 - Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.

41. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105 ksi Yield Strength.

F. Builders Hardware Manufacturers Association (BHMA):

1. ANSI/BHMA A156.20 - American National Standard for Strap and Tee Hinges and Hasps.

G. National Ornamental & Miscellaneous Metals Association:

1. NOMMA Guideline 1 - Joint Finishes.

H. SSPC: The Society for Protective Coatings:

1. SSPC - Steel Structures Painting Manual.
2. SSPC Paint 15 - Steel Joist Shop Primer/Metal Building Primer.
3. SSPC Paint 20 - Zinc-Rich Coating (Type I - Inorganic and Type II - Organic).
4. SSPC SP 1 - Solvent Cleaning.
5. SSPC SP-7 Brush-off Blast Cleaning.
6. SSPC SP 10 - Near-White Blast Cleaning.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Certification and credentials of the fabrication facility, where work is to be performed, which document that the steel fabricator is an 'Approved Fabricator'.

C. Manufacturer's Data: For information only, submit copies of manufacturer's specifications, load tables, dimension diagrams, anchor details and installation instructions for products to be used in miscellaneous metal work, including paint products.

D. Shop Drawings:

1. General: Submit copies of shop drawings for the fabrication and erection of all assemblies of miscellaneous metal work which are not completely shown by the manufacturer's data sheets.

    a. Include plans, elevations and details of sections and connections and fabricators proposed shop coat paint or galvanizing specifications.

    b. Shop drawings shall include size and location of drain holes for galvanizing process. Submit for engineer approval.

    c. Show anchorage and accessory items.

    d. Furnish setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, anchor bolts, and miscellaneous items having integral anchors, which are to be embedded in concrete construction.

    e. Indicate welded connections using standard AWS A2.4 welding symbols.

    f. Indicate net weld lengths.

    g. Indicate welding procedures that comply with applicable AWS standards. Welding procedures shall be submitted for review along with manufacturer and make of weld filler material.

2. Stairs, Handrails and Railings:

    a. Indicate profiles, sizes, and accessories.

    b. Clearly identify connection on Shop Drawings with complete details to the extent that all connections can be made without further reference to the Contract Documents.

    c. Include information indicating weld type, joint preparation information such as degree of bevel, weld length, etc. Indicated root openings, back-ups, filler, runout tabs, etc.

d. Length and height of stairs shown on the plans is approximate in nature. Engineer reserves the right to make final adjustments to stair dimensions during shop drawing submittals for adjustments to finished grade elevation, at no additional cost to the Owner.

e. Indicate changes from the Contract Documents on the Shop Drawings. Structural calculations for any proposed changes or alterations to the configuration shown in the drawings. Calculations shall be Stamped by a Structural Engineer licensed in the State of Tennessee.

3. Gratings:

a. Indicate details of gratings, plates, component supports, anchorages, openings, perimeter construction details, and tolerances. All grating connection shall use a bolted or machine-screw attached saddle clip. Self-tapping screws shall not be used in grating connections.

E. Welders Certificates: Certify welders employed on the Work, verifying AWS or other Welder Certification Program requirements for the proposed areas of work.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Transporting, handling, storing, and protecting products shall be in accordance with manufacturer's requirements.

B. Inspection: Accept metal fabrications on-site in labeled shipments. Inspect for damage.

C. Protect metal fabrications from damage by exposure to weather or by ground contact.

1.5 EXISTING CONDITIONS

A. Field Measurements: Verify field measurements prior to preparation of Shop Drawings and fabrication. Indicate field measurements on Shop Drawings.

1. Do not delay job progress; allow for trimming and fitting where taking field measurements before fabrication.

PART 2 PRODUCTS

2.1 GENERAL

A. For the fabrication of miscellaneous metal work items which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names, roughness and defects which impair strength, durability, and appearance. Remove such blemishes by grinding or

by welding and grinding prior to cleaning, treating and application of surface finishes including zinc coatings.

2.2 ANCHOR BOLTS

A. All anchors shall be epoxy anchors or expansion anchors as shown in the Drawings.

B. Materials:

1. As shown in the Drawings.

2. For wetted atmospheric conditions

   a. Type 316L stainless steel.

3. Threaded rod, nuts, bolts, and washers:

   a. Material matching anchor insert type.

C. Types:

1. Threaded-type Concrete Inserts:

   a. Internally threaded to receive machine bolts.
   b. Stainless steel, ASTM F593, Group 1-CW1 type 316L

D. Manufacturers:

1. Hilti, Inc.
2. Simpson Strong-Tie Co., Inc.
3. DeWalt, Inc.
4. Proprietary products as named in the Drawings.

2.3 MISCELLANEOUS FABRICATIONS, FRAMING AND SUPPORTS

A. Provide miscellaneous framing and supports required to complete the Work.

B. Fabricate miscellaneous units to the sizes, shapes and profiles shown in the Drawings or, if not shown, of the required dimensions to receive adjacent grating, plates doors, or other work to be retained by the framing.

C. Except as otherwise shown, fabricate from structural shapes and plate and bars, all welded construction using mitered corners, welded brackets and splice plates and a minimum number of joints for field connection.

D. Cut, drill, and tap units to receive hardware and similar items to be anchored to the work.

E. Equip units with integrally welded anchors for casting into concrete, bolting to structural metal or building into masonry. Furnish inserts if units must be installed after concrete is placed.

2.4 NON-SHRINK GROUT

A. Where required for anchoring, patching, or sealing, grouting, and sealing compounds shall conform to the requirements of Section 03 60 00, Grouting.

2.5 MATERIALS

A. Materials listed below shall be provided unless otherwise noted in the Drawings or other sections of these specification.

B. Steel:

1. Structural W Shapes: ASTM A992.

2. Structural Shapes: ASTM A36.

3. Channels and Angles: ASTM A36.

4. Steel Plate: ASTM A36.

   a. Steel Plate to be Bent or Cold Formed: ASTM A283, Grade C.

5. Hollow Structural Sections: ASTM A500, Grade B.

6. Structural Pipe: ASTM A53, Grade B, Schedule 40 unless shown otherwise in Drawings.

7. Bar: ASTM A36 .

   a. Cold-Finished Steel Bar: ASTM A108, grade as selected by fabricator.

8. Sheet Steel: ASTM A653, Grade 33 Structural Quality.

9. Tubing: ASTM A513, Type 5, minimum 50 ksi yield strength.

10. Standard Bolts: ASTM A307; Grade A.

    a. Washers: ASTM F844.

11. High Strength Bolts: ASTM F3125, Grade A325.

    a. Washers: ASTM F436; Type 1.

12. Nuts: ASTM A563; heavy-hex type.

13. Welding Materials: AWS D1.1; type required for materials being welded.

C. Stainless Steel:

1. Bars and Shapes: ASTM A276; Type 316.
2. Tubing: ASTM A269; Type 316.
3. Pipe: ASTM A312, seamless; Type 316.
4. Plate, Sheet, and Strip: ASTM A666; Type 316.
5. Bolts, Nuts, and Washers: ASTM F593 CW1, Type 316.
6. Welding Materials: AWS D1.6; type required for materials being welded.

D. Aluminum:

1. Structural Aluminum Shapes and Plates: ASTM B308, Alloy 6061, Temper T66, Anodic Coating Class I, anodized after fabrication.

2. Aluminum-Alloy-Drawn Seamless Tubes: ASTM B210 Alloy 6063, Temper T6.

3. Aluminum-Alloy Bars: ASTM B211 Alloy 6063, Temper T6.

4. Bolts, Nuts, and Washers: Stainless steel or Steel, galvanized.

5. Welding Materials: AWS D1.1; type required for materials being welded.

E. Bolts, Nuts, and Washers for Equipment and Piping:

1. Select fasteners for the type, grade and class required for the installation of miscellaneous metal items.

2. Carbon Steel:

a. General: Zinc-coated, ASTM A153.
b. Structural Connections: ASTM A307, Grade A (60 ksi), hot dip galvanized.
c. Anchor Bolts: ASTM A307, Grade A (60 ksi), hot dip galvanized.
d. Pipe and Equipment Flange Bolts: ASTM A193, Grade B-7.
e. High Strength Bolts: ASTM F3125, Heavy Hex Head.

3. Stainless Steel: Type 316 stainless steel, Class 2; ASTM A193 for bolts; ASTM A194 for nuts.

a. Where stainless steel bolts are in contact with dissimilar metals, glass epoxy insulating sleeves and washers shall be used to electrically isolate the bolts.

2.6 FABRICATION

A. Workmanship:

1. Use materials of the size and thicknesses shown in the Drawings or, if not shown, of the required size and thickness to produce adequate strength and durability in the finished product for the intended use as approved by the Engineer.

2. Work to the dimensions shown in the Drawings or accepted on Shop Drawings, using proven details of fabrication and support.

3. Use the type of materials shown in the Drawings or specified for the various components of work.

4. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

5. Ease exposed edges to a radius of approximately 1/32-inch, unless otherwise shown in the Drawings.

6. Form bent-metal corners to the smallest radius possible without causing grain separation or otherwise impairing the Work.

B. Fit and shop-assemble items in largest practical sections for delivery to Site.

C. Fabricate items with joints tightly fitted and secured.

D. Continuously seal join members by means of continuous welds in accordance with the recommendations of AWS, unless otherwise noted or approved.

E. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small, uniform radius.

F. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

G. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

H. Loose Bearing and Leveling Plates:

1. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of required thickness and bearing area.

2. Drill plates to receive anchor bolts and for grouting as required.

3. Galvanize after fabrication.

I. Miscellaneous Steel Trim:

1. Provide shapes and sizes for profiles shown in the Drawings.

2. Except as otherwise indicated, fabricate units from structural steel shapes and plates and steel bars, with continuously welded joints and smooth exposed edges.

3. Use concealed field splices wherever possible.

4. Provide cutouts, fittings and anchorages as required for coordination of assembly and installation with other work.

J. Fabrication Tolerances:

1. Squareness: 1/8-inch maximum difference in diagonal measurements.
2. Maximum Offset between Faces: 1/16-inch.
3. Maximum Misalignment of Adjacent Members: 1/16-inch.
4. Maximum Bow: 1/8-inch in 48 inches.
5. Maximum Deviation from Plane: 1/16-inch in 48 inches.

2.7 FINISHES

A. Steel:

1. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

2. Do not prime surfaces in direct contact with concrete or where field welding is required.

3. Where noted in drawings, coat contact surface between steel and concrete with 10 mil layer of Carboline Bitumastic 300 or equal.

4. Prime-paint items with one coat, except where galvanizing is specified.

5. Coatings as specified per Section 09 90 00, Painting and Coating.

a. Primer paint selected must be compatible with the required finish coats of paint.

6. Galvanizing for Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strips: ASTM A123; hot dip galvanize after fabrication.

7. Galvanizing for Fasteners, Connectors, and Anchors:

a. Hot-Dip Galvanizing: ASTM A153.
b. Mechanical Galvanizing: ASTM B695; Class 50 minimum.

8. Chrome Plating: ASTM B177, nickel-chromium alloy, polished finish.

9. Sheet Steel: Galvanized.

10. Bolts: Hot dip galvanized.

11. Nuts: Hot dip galvanized.

12. Washers: Hot dip galvanized.

13. Touchup Primer for Galvanized Surfaces: ASTM A780 (A780M), A1. Repair Using Zinc-Based Alloys (Heat and Stick Method).

B. Stainless Steel:

1. Satin-Polished Finish: Number 4, satin directional polish parallel with long dimension of finished face.

C. Aluminum:

1. Protection of All Aluminum:

a. Aluminum surfaces in contact with cementitious, masonry or dissimilar materials, apply the following coating system:

1) One (1) coat of epoxy primer, 1 to 2 mils dry film (D.F.).
2) Followed by two (2) coats of Bitumastic, 6 to 8 mils D.F.
3) Followed by two (2) coats of tarset material, 6 to 8 mils D.F.

D. Shop Painting

1. Shop painting of metal fabrications shall be allowed only at the sole discretion of the Engineer.

2. Shop paint miscellaneous metal work in accordance with Section 09 90 00, Painting and Coating, with the following exceptions:

a. Those members or portions of members to be embedded in concrete or masonry.

b. Surfaces and edges to be field welded.

c. Galvanized surfaces.

3. Remove scale, rust, and other deleterious materials before the shop coat of paint is applied.

    a. Clean off heavy rust and loose mill scale in accordance with SSPC SP-7, Brush-off Blast Cleaning.

    b. Remove oil, grease and similar contaminates in accordance with SSPC SP-1, Solvent Cleaning.

4. Immediately following surface preparation, brush, or spray on metal primer paint, applied in accordance with the manufacturer's instructions or as specified below.

5. Apply one (1) shop coat of metal primer paint to fabricated metal items, except apply two (2) coats of paint to surfaces which will be inaccessible after assembly or erection. Change color of second coat to distinguish it from the first.

E. Touch-up Painting, Pre-painted Items:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas of the shop paint, and paint all exposed areas with the same material as used for shop painting.

2. Apply touch-up coatings by brush or spray to provide a minimum dry film thickness of the original coating thickness.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive Work.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal and aluminum where Site welding is required.

B. Furnish setting drawings, diagrams, templates, instructions, and directions for the installation of anchorages, such as concrete inserts, anchor bolts and miscellaneous items having integral anchors. Supply steel items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections. Coordinate delivery of such items to the project Site.

3.3 INSTALLATION

A. Install items plumb and level, accurately fitted, and free from distortion or defects.

B. Make provisions for erection stresses. Install temporary bracing to maintain alignment until permanent bracing and attachments are installed.

C. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal items to in-place construction, including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.

D. Fit exposed connections accurately together to form tight hairline joints.

E. Grind joints smooth and touch-up shop paint coat.

F. Do not weld, cut, or abrade the surfaces of exterior units which have been hot dip galvanized after fabrication and are intended for bolted or screwed field connections.

G. Field-weld components indicated on Drawings and Shop Drawings.

H. Perform field welding according to AWS D1.1 with regards to procedures of manual shielded metal-arc welding, the appearance and quality of welds made, and the methods used in correcting welding work.

I. Obtain approval of Engineer prior to Site cutting or making adjustments not scheduled.

3.4 TOLERANCES

A. Maximum Variation from Plumb: 1/4-inch per story or for every 12 feet in height, whichever is greater, non-cumulative.

B. Maximum Variation from Level: 1/16-inch in 3 feet and 1/4-inch in 10 feet.

C. Maximum Offset from Alignment: 1/4-inch.

D. Maximum Out-of-Position: 1/4-inch.

3.5 FIELD QUALITY CONTROL

A. Welding: Inspect welds according to AWS D1.1.

B. Replace damaged or improperly functioning hardware.

C. After erection, touch up welds, abrasions, and damaged finishes with prime paint to match shop finishes.

1. For galvanizing repair, repair any damaged areas by heat and stick method as may be required.

D. Touch up factory-applied finishes according to manufacturer-recommended procedures.

3.6 ADJUSTING

A. Adjust operating hardware and lubricate as necessary for smooth operation.

END OF SECTION

SECTION 07 92 00 - JOINT SEALANTS

PART 1 GENERAL

This specification describes the sealing of architectural joints and cracks.

1.1 SECTION INCLUDES

A. Non-sag gun-able joint sealants.
B. Joint backings and accessories.

1.2 REFERENCE STANDARDS

A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015 (Reapproved 2022).

B. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants; 2018 (Reapproved 2022).

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

D. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2016.

E. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

F. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2018.

G. ASTM C1311 - Standard Specification for Solvent Release Sealants; 2022.

H. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2018.

I. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2017).

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:

1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.

2. List of backing materials approved for use with the specific product.

3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.

4. Substrates the product should not be used on.

C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

D. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.

E. Executed warranty.

1.4 QUALITY ASSURANCE

A. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.

1. Adhesion Testing: In accordance with ASTM C794.

2. Compatibility Testing: In accordance with ASTM C1087.

3. Allow sufficient time for testing to avoid delaying the work.

4. Deliver sufficient samples to manufacturer for testing.

5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.

1.5 WARRANTY

A. Manufacturer Warranty: Provide 2-year manufacturer warranty for installed sealants and accessories that fail to achieve a watertight seal, exhibit loss of adhesion or cohesion, or do not cure. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.1 JOINT SEALANT APPLICATIONS

A. Scope:

1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to:

a. Wall expansion and control joints.
b. Joints between door, window, and other frames and adjacent construction.
c. Joints between different exposed materials.
d. Openings below ledge angles in masonry.
e. Other joints indicated below.

2. Do not seal the following types of joints:

a. Intentional weep holes in masonry.

b. Joints indicated to be treated with manufactured expansion joint cover, or some other type of sealing device.

c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.

d. Joints where installation of sealant is specified in another section.

e. Joints between suspended panel ceilings/grid and walls.

B. Exterior Joints: Use nonsag nonstaining silicone sealant, unless otherwise indicated.

1. Lap Joints in Sheet Metal Fabrications: Butyl rubber, noncuring.

2.2 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

2.3 NONSAG JOINT SEALANTS

A. Nonstaining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.

1. Nonstaining to Porous Stone: Nonstaining to light-colored Masonry when tested in accordance with ASTM C1248.

2. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.

3. Color: Match adjacent finished surfaces.

B. Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.

1. Movement Capability: Plus and minus 25 percent, minimum.
2. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
3. Color: Match adjacent finished surfaces.
4. Cure Type: Single component, neutral moisture curing.
5. Service Temperature Range: Minus 65 to 180 degrees F (Minus 54 to 82 degrees C).

C. Polymer Sealant: ASTM C920; single component, cured sealant is paintable and mold/mildew resistant, low odor and VOC, and ultraviolet (UV) resistant.

1. Color: White.

D. Hybrid Urethane Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.

1. Movement Capability: Plus and minus 50 percent, minimum.
2. Hardness Range: 15 to 25, Shore A, when tested in accordance with ASTM C661.
3. Color: Match adjacent finished surfaces.
4. Service Temperature Range: Minus 75 to 300 degrees F (Minus 60 to 150 degrees C).

2.4 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.

1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.

2. Open Cell: 40 to 50 percent larger in diameter than joint width.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that joints are ready to receive work.
B. Verify that backing materials are compatible with sealants.
C. Verify that backer rods are of the correct size.

3.2 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.3 INSTALLATION

A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Provide joint sealant installations complying with ASTM C1193.

C. Install bond breaker backing tape where backer rod cannot be used.

D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

END OF SECTION

SECTION 09 90 00 - PAINTING AND COATING

PART 1 GENERAL

1.1 THE REQUIREMENT

A. Work under this Section shall include the protective coating of all specified surfaces including all surface preparation, pretreatment, coating application, touch-up of factory coated surfaces, protection of surfaces not to be coated, cleanup, and appurtenant work, all in accordance with the requirements of the Contract Documents.

B. This specification is applicable to coated pipe, steel, concrete, and other surfaces listed. Reservoir painting, pipe corrosion protection systems, galvanizing, and anodizing are specified elsewhere within the contract documents.

C. Related Work Specified in Other Sections -- Shop coatings and/or factory finishes on fabricated or manufactured equipment may be specified in other divisions. Some items with factory finishes, or corrosion resistant finishes may be scheduled or directed to be painted by the Engineer to unify a wall finish or color scheme, at the Engineer's discretion.

D. Exclusions -- Do not coat the following surfaces unless specified or directed elsewhere: Stainless steel, aluminum, copper, brass, bronze, and other corrosion-resistant material (except for valve bodies and piping); Electrical switch-gear and motor control centers having factory finish; Fencing; Multiple coated factory finished baked enamel or porcelain products; Concealed areas such as ducts, piping, conduits, and items specified elsewhere for special linings and coatings.

E. Damaged Factory Finish -- If directed by the Engineer, refinish the entire exposed surfaces of equipment chipped, scratched, or otherwise damaged in shipment or installation.

F. All coating coming in contact with potable water shall be NSF approved.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Comply with the provisions of the following codes, specifications, and standards, except as otherwise shown or specified.

1. "Architectural Specification Manual" by the Painting and Decorating Contractors of America (PDCA), 333 Taylor Avenue North, Seattle, Washington 98109.

2. "Systems and Specifications" - Volume 2 of Steel Structures Painting Council (SSPC).

3. NSF International (NSF) Standard No. 61.

4. NSF International (NSF) Standard No. 600 – Health Effects Evaluation and Criteria for Chemicals in Drinking Water (Effective beginning January 1, 2023)

B. References herein to "NACE" shall mean the published standards of the National Association of Corrosion Engineers, P.O. Box 986, Katy, TX 77450.

C. Pipe Coating Commercial Standards

ANSI/AWWA C105	Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids.
ANSI/AWWA C203	Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot Applied.
ANSI/AWWA C205	Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4-inch and Larger - Shop Applied
ANSI/AWWA C209	Cold Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Pipelines.
ANSI/AWWA C210	Liquid Epoxy Coating for Exterior and Interior of Steel Pipe.
ANSI/AWWA C213	Fusion Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines.
ANSI/AWWA C214	Tape Coating systems for the Exterior of Steel Water Pipelines.

D. Federal Specifications

DOD-P-23236A(SH)	Military Specification, Paint Coating Systems, Steel Ship Tank, Fuel and Saltwater Ballast.

1.3 MANUFACTURERS

A. Tnemec Company, Incorporated, 6800 Corporate Drive, Kansas City, Missouri, (800-863-6321).

B. Carboline Company, 2150 Schnetz Road, St. Louis, Missouri, (888-227-2654).

C. Sherwin-Williams Company, 11350 Alameda Drive, Strongsville, Ohio, (216-533-4472).

1.4 PIPING COLOR CODE

To facilitate identification of piping in plants and pumping stations, the following color scheme will be utilized:

Water Lines

Raw	Match existing

In situations where two colors do not have sufficient contrast to easily differentiate between them, a six-inch band of contrasting color should be on one of the pipes at approximately 30 inch intervals.

The name of the liquid or gas, along with directional arrows indicating the direction of flow should also be on the pipe.

Colors, where not specified, shall be as selected by the Engineer/Owner.

1.5 CONTRACTOR SUBMITTALS

A. Coating Materials List -- The Contractor shall provide a coating materials list which indicates the Manufacturer and the coating number, keyed to the coating systems herein.

B. Coating Manufacturer's and Applicator Information -- For each coating system to be used the Contractor shall submit, the following listed data.

1. Manufacturer's data sheet for each product used, including statements on the suitability of the material for the intended use.

2. Manufacturer's instructions and recommendations on surface preparation and application.

3. Colors available for each product and each coat.

4. Compatibility of shop and field applied coatings (where applicable).

5. Material safety data sheet (MSDS) for each product used.

6. The Manufacturer’s recommended products and procedures for field coating repairs and field preparation of field cut pipe ends.

7. The name of the proposed coating applicator shop along with certification that the applicator shop is qualified and equipped to apply the coatings systems as specified.

8. Certificate -- Submit Manufacturer's certificate of compliance with the specifications and standards signed by a representative in the Manufacturer's employ.

9. Samples -- Provide painted surface areas at the job for approval of main color selections or submit sample on 12-inch sample of substrate using required finish system at Engineer’s discretion.

1.6 QUALITY ASSURANCE

A. Painter Qualifications -- The Painting/Coating Contractor must be capable of performing the various items of work as specified. The Painting/Coating Contractor shall furnish a statement covering experience on similar work, a list of machinery, plant, and other equipment available for the proposed work, and a financial statement, including a complete statement of the Painter/Coating Contractor’s financial ability and experience in performing similar painting and coating work. The Painting/Coating Contractor shall have a minimum of 5 years practical experience and a successful history in the application of the specified products to concrete/steel surfaces. Upon request, the Painting/Coating Contractor shall substantiate this requirement by furnishing a list of references, which shall include jobs of similar nature.

B. The Contractor shall give the Engineer a minimum of 3 days advance notice of the start of any field surface preparation work of coating application work, and a minimum of 7 days advance notice of the start of any shop surface preparation work.

C. All such work shall be performed only in the presence of the Engineer unless the Engineer has granted prior approval to perform such work in its absence.

D. Inspection by the Engineer, or the waiver of inspection of any particular portion of the work, shall not relieve the Contractor of its responsibility to perform the work in accordance with these Specifications.

E. Surface Preparation -- Evaluation of blast cleaned surface preparation work will be based upon comparison of the blasted surfaces with the standard samples available from the NACE, using NACE standard TM-01-70.

F. Scaffolding shall be erected and moved to locations where requested by the Engineer to facilitate inspection. Additional illumination shall be provided by the Contractor to cover all areas to be inspected.

G. Paint Products -- No request for substitution shall be approved which decreases the film thickness designated or the number of coats to be applied, or which offers a change from the generic type of coating specified. Painting shall be done at such times as the Contractor and Engineer may agree upon in order that dust-free and neat work be obtained. All painting shall be in strict accordance with the

Manufacturer's instructions and shall be performed in a manner satisfactory to the Engineer.

H. Manufacturer's Representative -- Require Coating Manufacturer's representative to be at job site when the first day's coating application is in progress and periodically during progress of the work.

I. Labels -- Deliver to the job site in the original sealed containers with Manufacturer's name, product name, type of product, Manufacturer's specification or catalog number or federal specification number, and instructions for reducing where applicable.

J. Colors -- Colors will be selected from Manufacturer's standard colors as reviewed by Engineer and approved by the Owner. Colors for special coatings that are limited in their availability and color selection will be chosen on the basis of Manufacturer's standard colors, provided that the Manufacturer's product line represents a color range comparable to similar products of other manufacturers.

K. Flame Spread -- Provide paint materials which will result in a Class II finish for all coated surfaces in exit corridors, and a Class III finish for all other interior rooms or areas.

L. Film Thickness Testing -- On ferrous metals, the dry film coating thickness shall be measured in accordance with the SSPC "Paint Application Specification No. 2" using a magnetic-type dry film thickness gauge such as Mikrotest model FM, Elcometer model 111/1EZ, or equal. Each coat shall be tested for the correct thickness. No measurements shall be made until at least 8 hours after application of the coating. On non-ferrous metals and other substrates, the coating thicknesses shall be measured at the time of application using wet film gauge readings and destructive film thickness tests.

M. Inspection Device -- The Contractor shall furnish, until final acceptance of such coatings, inspection devices in good working condition for the detection of holidays and measurement of dry-film thicknesses of protective coatings. Dry-film thickness gauges shall be made available for the Engineer’s use at all times while coating is being done, until final acceptance of such coatings. The Contractor shall provide the services of a trained operator of the holiday detection devices until the final acceptance of such coatings.

N. Holiday Testing -- The Contractor shall holiday test all coated ferrous surfaces. Areas which contain holidays shall be marked and repaired or recoated in accordance with the Coating Manufacturer's printed instructions and then retested.

1. Coatings With Thickness Exceeding 20 Mils -- For surfaces having a total dry film coating thickness exceeding 20 mils: pulse-type holiday detector such

as Tinker & Rasor Model AP-W, D.E. Stearns Co. Model 14/20, or equal shall be used. The unit shall be adjusted to operate at the voltage required to cause a spark jump across an air gap equal to twice the specified coating thickness.

2. Coatings With Thickness of 20 Mils or Less -- For surfaces having a total dry film coating thickness of 20 mils or less: Tinker & Rasor Model M1 nondestructive type holiday detector, K-D Bird Dog, or equal shall be used. The unit shall operate at less than 75 volts. For thicknesses between 10 and 20 mils, a non-sudsing type wetting agent, such as Kodak Photo-Flo, or equal, shall be added to the water prior to wetting the detector sponge.

1.7 DELIVERY, HANDLING, AND STORAGE

A. Deliver in labeled containers as specified above and store in a locked room accessible for inspection. Comply with fire and health regulations.

B. Provide adequate heat and forced mechanical ventilation for health, safety, and drying requirements. Use explosion proof equipment. Provide face masks.

C. Protect adjacent surfaces with suitable masking and drop cloths as required. Remove cloths or waste from the Project daily.

D. Apply to surfaces under recommended environmental conditions and within the limitations established by the Material Manufacturer. Do not apply coating in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or to damp or wet surfaces, unless otherwise permitted by the Coating Manufacturer's printed instructions. Coating application may be continued during inclement weather only if the areas and surfaces to be painted are enclosed and heated within the temperature limits specified by the Paint Manufacturer during application and drying periods.

1.8 PROTECTION

A. Follow all safety recommendations of Manufacturer regarding ventilation and danger from explosion or breathing paint fumes or skin exposure, and all applicable O.S.H.A. and other regulations.

B. Protect surface adjacent to work being coated from overspray, drips, or other damage.

1.9 EXTRA STOCK

Provide one gallon of each type and color, fully labeled, at completion of job.

PART 2 PRODUCTS

2.1 GENERAL

A. Definitions -- The terms "paint," "coatings," or "finishes" as used herein, shall include surface treatments, emulsions, enamels, paints, epoxy resins, tape, and all other protective coatings, excepting galvanizing or anodizing, whether used as a pretreatment, primer, intermediate coat, or finish coat. The term "DFT" means minimum dry film thickness.

B. General -- Coating materials shall be sealed in containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, Manufacturer's directions, and name of Manufacturer, all of which shall be plainly legible at the time of use.

C. The Contractor shall use coating materials suitable for the intended use and recommended by their Manufacturer for the intended service.

D. Compatibility -- In any coating system only compatible materials from a single manufacturer shall be used in the work. Particular attention shall be directed to compatibility of primers and finish coats. If necessary, subject to the approval of the Engineer, a barrier coat shall be applied between existing prime coat and subsequent field coats to ensure compatibility.

E. Colors -- All colors and shades of colors of all coatings shall be as selected or specified by the Engineer. Each coat shall be of a slightly different shade, to facilitate inspection of surface coverage of each coat. Finish colors shall be as selected from the Manufacturer's standard color samples by the Engineer. Color pigments shall be lead free.

F. Protective Coating Materials -- Products shall be standard products produced by recognized manufacturers who are regularly engaged in production of such materials for essentially identical service conditions. Where requested, the Contractor shall provide the Engineer with the names of not less than 10 successful applications of the proposed Manufacturer's products demonstrating compliance with this specification requirement.

G. Substitute or "Or-Equal" Submittals -- Unless otherwise specified, materials are from the catalogs of the companies listed herein. Materials by other manufacturers are acceptable provided that they are established as being compatible with and of equal quality to the coatings of the companies listed. The Contractor shall provide satisfactory documentation from the firm manufacturing the proposed substitute or "or equal" material that said material meets the specified requirements and is equivalent or better than the listed materials.

H. The cost of all testing and analyzing of the proposed substitute materials that may be required by the Engineer shall be paid by the Contractor. If the proposed

substitution requires changes in the contract work, the Contractor shall bear all such costs involved and the costs of allied trades affected by the substitution.

2.2 INDUSTRIAL COATING SYSTEMS

A. General

Provide and apply the industrial coatings systems which follow as listed in the coating schedule, as required by these specifications, and as directed by the Engineer. Coat all existing and new exposed interior or exterior surfaces and submerged and intermittently submerged surfaces as indicated, except as specifically excluded in Part 1 of this section or on the drawings or finish schedules. Coating System Numbers listed below shall be used as the Coating System code letter, and shall be used on any coating submittals or correspondence.

B. Industrial coating systems shall be as follows

1. Coating System 100

a. Location -- Exposed, unprimed, non-galvanized, nonsubmerged metal surfaces, both interior and exterior including piping, and structural steel.

b. Surface Preparation -- As specified herein.

c. Coating System -- Apply prime coat and topcoat, 4.0-6.0 mils each coat of Tnemec Series 66-2 Hi-Build Epoxoline, or Carboline Carboguard 60 (CARB), Carboline Carboguard 890 VOC (SCAQMD), or other approved equal. Color as selected by Owner.

2. Coating System 101

a. Location -- Exposed metal surfaces, shop primed, both interior and exterior including piping, railings, ladders, steel doors, and any other metal items not otherwise specified.

b. Surface Preparation -- As specified herein.

c. Coating System -- Apply shop prime coat 3.0 mils DFT Tnemec Series 90-97 Tneme-Zinc, one coat 4.0 - 6.0 mils DFT Tnemec Series 66 Hi-Build Epoxoline, and 3.0 - 4.0 mils DFT of Tnemec Series 175 Endura Shield, or Carboline Carbozinc 859 Series at 3.0 to 5.0 mils DFT, Carboline 820 at 4.0 to 8.0 mils DFT, and Carboline Carbothane 134 Series at 2.0 to 2.5 mils DFT or other approved equal. Color as selected by Owner.

3. Coating System 102

a. Location -- Unprimed or non-galvanized, continuously or intermittently submerged metal items, both interior and exterior including piping, structural steel, and all other metal items not otherwise specified.

b. Surface Preparation -- As specified herein.

c. Coating System -- Prime, intermediate and topcoat, 4.0-6.0 mils each coat of Tnemec Series 20 Pota-Pox, or equal. Color as selected by Owner.

2.3 SPECIAL PIPE AND SEVERE SERVICE COATING SYSTEMS

A. NA

2.4 ARCHITECTURAL COATING SYSTEMS

A. NA

PART 3 EXECUTION

3.1 STORAGE, MIXING, AND THINNING OF MATERIALS

A. Manufacturer's Recommendations -- Unless otherwise specified herein, the Coating Manufacturer's printed recommendations and instructions for thinning, mixing, handling, applying, and protecting its coating materials, for preparation of surfaces for coating, and for all other procedures relative to coating shall be strictly observed.

B. All protective coating materials shall be used within the Manufacturer's recommended shelf life.

C. Storage and Mixing -- Coating materials shall be protected from exposure to cold weather, and shall be thoroughly stirred, strained, and kept at a uniform consistency during application. Coatings of different manufacturers shall not be mixed together.

3.2 SURFACE PREPARATION STANDARDS

A. The following referenced surface preparation specifications of the Steel Structures Painting Council shall form a part of this specification.

1. Solvent Cleaning (SSPC-SP1) -- Removal of oil, grease, soil, salts, and other soluble contaminants by cleaning with solvent, vapor, alkali, emulsion, or steam.

2. Hand Tool Cleaning (SSPC-SP2) -- Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, by hand chipping, scraping, sanding, and wire brushing.

3. Power Tool Cleaning (SSPC-SP3) -- Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, by power tool chipping, descaling, sanding, wire brushing, and grinding.

4. White Metal Blast Cleaning (SSPC-SP5) -- Removal of all visible rust, oil, grease, soil, dust, mill scale, paint, oxides, corrosion products, and foreign matter by blast cleaning.

5. Commercial Blast Cleaning (SSPC-SP6) -- Removal of all visible oil, grease, soil, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except that staining shall be limited to no more than 33 percent of each square inch of surface area.

6. Brush-Off Blast Cleaning (SSPC-SP7) -- Removal of all visible oil, grease, soil, dust, loose mill scale, loose rust, and loose paint.

7. Near-White Blast Cleaning (SSPC-SP10) -- Removal of all visible oil, grease, soil, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except that staining shall be limited to no more than 5 percent of each square inch of surface area.

8. High- and Ultra High- Pressure Water Jetting (SSPC-SP12): Water jetting at high- or ultra-high-pressure to prepare a surface for recoating using pressure above 10,000 pounds per square inch (psi).

9. Surface Preparation of Concrete (SSPC-SP-13) - Surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems.

10. Industrial Blast Cleaning (SSPC-SP14): Blast cleaning to remove all visible oil, grease, dust, and dirt, when viewed without magnification

3.3 CORRECTIONS AND CLEANUP

At completion any damaged, de-laminated or defaced coated surfaces shall be touched up, restored, and left in first class condition. Any coated or finished surfaces damaged in fitting or erection shall be restored. If necessary, an entire wall shall be refinished rather than spot finished. Upon completion and prior to final acceptance, all equipment and unused materials accumulated in the coating process shall be removed from the site and any spillage, spatter spots or other misplaced coating material shall be removed in a manner which will not damage surfaces. Perform required patching, repair, and cleaning to the satisfaction of the Engineer. Cooperate and coordinate work with the work of other trades in the removal and replacement of hardware, fixtures, covers, switch plates, etc., as required for coating.

3.4 SURFACE PREPARATION

A. General

Prepare all surfaces scheduled to receive new coating systems, as required to provide for adequate bonding of the specified coating system to the substrate material. Request review of prepared surfaces by the Engineer prior to proceeding. For existing coated surfaces, hand wash with cleaner or product recommended by Coating Manufacturer to properly prepare existing surface and provide for bonding of coating specified to follow. Remove any loose, peeling or flaking coating, or mildewed areas. Surface preparation minimums shall be as follows:

1. Exposed metal items, non-submerged, unprimed, non-galvanized both interior and exterior, including piping, structural steel and all other metal items not otherwise specified, shall undergo surface preparation in accordance with SSPC-SP6, "Commercial Blast Cleaning".

2. Exposed metal items, shop primed, both interior and exterior including piping, steel doors, steel ladders to be painted, and railings, and all other metal items not otherwise specified, shall undergo surface preparation in accordance with SSPC-SP1, "Solvent Cleaning"; SSPC-SP2, "Hand Tool Cleaning"; and SSPC-SP3, "Power Tool Cleaning" as may be required to remove grease, loose, or peeling or chipped paint.

3. Metal items, unprimed or non-galvanized, continuously or intermittently submerged, both interior and exterior including piping, structural steel, and all other metal items not otherwise specified, shall undergo surface preparation in conformance with SSPC-SP10, "Near-White Blast Cleaning".

4. Stainless Steel – Non-submerged and submerged, exposed piping and fittings, both interior and exterior shall undergo surface preparation in accordance with SSPC-SP1, "Solvent Cleaning".

5. Polyvinyl Chloride (PVC) – Non-submerged, both interior and exterior, process piping and plumbing, shall be lightly sanded prior to application of the specified coating system to follow.

6. Non-submerged Concrete - Clean all concrete surfaces of dust, form oil, curing compounds, or other incompatible matter. Etch and prime if required by Manufacturer for specified coating products to follow. Allow minimum 28-day cure of concrete prior to application of coating systems.

7. Concrete Masonry Units -- Repair all breaks, cracks, and holes with concrete grout. The surface must be free of dirt, dust, loose sand, and other foreign matter. Brush clean. Allow minimum 28-day cure of concrete joint mortar and repair grout prior to application of coatings system.

8. Wood -- Wood surfaces shall be thoroughly cleaned and free of all foreign matter with cracks, nail holes, and other defects properly filled, smoothed, and sandpapered to fine finish. Wipe clean of dust.

9. Preparation of All Existing Coated Surfaces -- Removed rough and defective coating film from material surfaces to be painted. Touch up with approved primer. Clean all greasy or oily surfaces, to be painted, with benzine or mineral spirits or Rodda's Gresof before coating, or as recommended by Manufacturer. For walls, patch existing nicks and gouges, sand to match wall finish.

3.5 PRIME COATING

A. Exposed Steel -- Prime coat all exposed steel in accordance with SSPC PS 13.01 for epoxy-polyamide coating systems. Prime coats shall be applied following completion of surface preparation requirements as specified in paragraph 3.4.A.1 above.

B. Galvanized Metal -- After surface preparation specified above, prime galvanized metal items receiving paints as specified with Tnemec Series 66 Hi-Build Epoxaline or equal, verifying with Manufacturer before application the compatibility with coatings specified to follow.

C. Shop Primed Metal -- Where indicated on the plans or coating schedule and following the surface preparation procedures specified in paragraph 3.4.A.2 above, the Contractor shall apply intermediate and topcoats of the specified paint system to shop primed metal. The Contractor shall verify with the Manufacturer(s) representative of the item(s) to be painted, before application, the compatibility of shop primers with the specified intermediate and topcoat coating systems.

D. Non-Shop Primed Metal and Piping -- Prime coat all exposed metal and piping, except stainless steel, received at job site following completion of surface preparation requirements as specified in Paragraph 3.4.A.1 above. Prime paint in accordance with SSPC PS No. 13.01 for epoxy-polyamide primers. Epoxy-polyamide primers shall conform to the standards set forth in SSPC Paint Specification No. 22.

E. Cast-In-Place Reinforced Concrete -- After surface preparation specified above, prime coat concrete as specified in the coating schedule found elsewhere in the specifications.

F. Concrete Masonry Units -- After surface preparation specified above, prime coat as specified in the coating schedule found elsewhere in the specifications.

G. Wood Surfaces -- Following surface preparation specified above, prime coat exterior exposed wood surfaces with appropriate coating system as specified in the painting schedule.

3.6 FIELD PRIME

Wherever shop priming has been damaged in transit or during construction, the damaged area shall be cleaned and touched up with field primer specified herein or returned to the shop for resurfacing and re-priming, at the Engineer’s discretion. Metal items delivered to the job site unprimed shall be cleaned and primed as specified herein.

3.7 APPLICATION

A. Thickness -- Apply coatings in strict conformance with the Manufacturer's application instructions. Apply each coat at the rate specified by the Manufacturer to achieve the dry mil thickness specified. If material must be diluted for application by spray gun, build up more coating to achieve the same thickness as undiluted material. Correct apparent deficiency of film thickness by the application of an additional coat.

B. Porous Surfaces -- Apply paint to porous surfaces as required by increasing the number of coats or decreasing the coverage as may be necessary to achieve a durable protective and decorative finish.

C. Blast cleaned ferrous metal surfaces shall be painted before any rusting or other deterioration of the surface occurs. Blast cleaning shall be limited to only those surfaces that can be coated in the same working day.

D. Coatings shall be applied in accordance with the Manufacturer's instructions and recommendations, and this Section, whichever has the most stringent requirements.

E. Special attention shall be given to edges, angles, weld seams, flanges, nuts and bolts, and other places where insufficient film thicknesses are likely to be present. Use stripe coating for these areas.

F. Special attention shall be given to materials which will be joined so closely that proper surface preparation and application are not possible. Such contact surfaces shall be coated prior to assembly or installation.

G. Ventilation -- Adequately ventilate enclosed rooms and spaces during painting and drying periods.

H. Apply coatings to surfaces under recommended environmental conditions and within the limitations established by the Material Manufacturer. Acrylics require 60 degrees F and above temperature and below 50 percent relative humidity. Apply water-based paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 50 degrees F and 90 degrees F unless otherwise permitted by the Paint Manufacturer's printed instructions.

I. Drying Time -- Do not apply next coat of coat until each coat is dry. Test non-metallic surfaces with moisture meter. The Manufacturer's recommended drying time shall mean an interval under normal condition to be increased to allow for adverse weather or drying conditions. Coating Manufacturer's representative shall verify by cure testing, complete cure of coatings systems used for immersion service.

END OF SECTION

SECTION 26 05 01 - ELECTRICAL INSTALLATION AND MATERIALS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This Specification Section covers the requirements for the furnishing of all designs, labor, supervision, equipment, materials and methods for performing all operations necessary to meet the requirements of electrical work for the project.

B. Furnish, install, interconnect and test the equipment and materials specified herein.

C. Site elevation, weather data, seismic requirements and other information and general criteria applicable to the work and materials specified herein are provided in the related Sections listed below and other Specification Sections.

1.2 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 1 Specification Sections included in Contract Documents, and other Sections as they apply to this Section.

1.3 REFERENCES

A. ANSI – American National Standards Institute

ANSI/NEMA C80.1, Rigid Steel Conduit - Zinc Coated

ANSI/NEMA C80.3, Electrical Metallic Tubing - Zinc Coated (EMT)

ANSI/NEMA C82.1, Specifications for Fluorescent Lamp Ballasts

ANSI/NEMA C82.4, Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamp Ballasts (Multiple Supply Type)

ANSI/IEEE C2, National Electric Safety Code (NESC)

ANSI/IEEE No. 81, IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

ANSI/IEEE No. 515, IEEE Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Heat Tracing for Industrial Applications

ANSI/IEEE 43, Recommended Practice for Testing Insulation Resistance of Rotating Machinery.

ANSI/IEEE 112, Standard Test Procedure for Polyphase Induction Motors and Generators.

ANSI/IEEE 114, Test Procedure for Single-phase Induction Motors.

ANSI/NEMA PB 1, Panelboards

ANSI/NFPA 70, National Electrical Code (NEC)

ANSI/UL 489, UL Standard for Safety Molded-Case Circuit Breakers and Circuit-Breaker Enclosures

ANSI/UL 845, Motor Control Centers

B. IEEE – Institute of Electrical and Electronic Engineers

IEEE 519, IEEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems

C. ASTM – American Society for Testing and Materials

ASTM A123, Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products

ASTM A475, Standard Specification for Zinc-Coated Steel Wire Strand

ASTM A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM B1, Standard Specification for Hard-Drawn Copper Wire

ASTM B3, Standard Specification for Soft or Annealed Copper Wire

ASTM B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard or Soft

ASTM B227, Standard Specification for Hard-Drawn Copper-Clad Steel Wire

ASTM B695, Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel

D. NETA – International Electrical Testing Association

ATS - Acceptance Testing Specifications for Electric Power Distribution Equipment and Systems

E. NEMA – National Electrical Manufacturers Association

NEMA 250, Enclosures for Electrical Equipment (1000 Volts Maximum)

NEMA AB 1, Molded Case Circuit Breakers and Molded Case Switches

NEMA FB 1, Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies

NEMA ICS 2, Industrial Control Devices, Controllers, and Assemblies

NEMA ICS 3, Industrial Control and Systems Factory Built Assemblies

NEMA ICS 4, Industrial Control and Systems Terminal Blocks

NEMA KS 1, Enclosed and Miscellaneous Distribution Equipment Switches (600 V Maximum)

NEMA MG 1, Motors and Generators

NEMA TC 8-90, Extra-Strength PVC Plastic Utilities Duct for Underground Installation

NEMA TC 9-90, Fittings for ABS and PVC Plastic Utilities Duct for Underground Installation

NEMA WC 7, Cross-Linked Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

NEMA WC 8, Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

F. NFPA – National Fire Protection Association

National Fire Code, all inclusive as applicable.

G. OSHA – Occupational Safety and Health Administration

OSHA 29 CFR 1926.417, Lockout and Tagging of Circuits

H. UL – Underwriters' Laboratories, Inc.

UL 98, Enclosed and Deadfront Switches

UL 360, Liquid-Tight Flexible Steel Conduit

UL 489, Molded Case Circuit Breakers and Circuit Breaker Enclosures

UL 508A, Industrial Control Panels

UL 514B, Fittings for Cable and Conduit

UL 698A, Industrial Control Panels Relating to Hazardous (Classified) Locations

UL 845, Standard for Safety Motor Control Centers

UL 1008, Standard for Transfer Switch Equipment

UL 1449, Standard for Transient Voltage Surge Suppressors

I. FM – FM Global

All inclusive, as applicable.

1.4 DEFINITIONS AND AMBIENT REQUIREMENTS

A. Definitions:

1. Contract Documents: Purchase and contractual documentation and agreements among Owner, Engineer, Contractor and Manufacturers.

2. Contractor: Contractor providing and installing equipment and systems. Carries ultimate responsibility for a complete and operable facility.

3. Engineer: Overseeing engineering firm and Owner's representative.

4. Manufacturer: Supplier/fabricator of equipment and components to Contractor.

5. Owner: City of Alcoa, TN.

B. Ambient Conditions:

1. Maximum Temperature: +105°F
2. Minimum Temperature: -30°F
3. Elevation: 2,150 feet above sea level

C. Seismic Requirements: In accordance with the Contract Documents.

D. Wind Design Requirements: In accordance with the Contract Documents.

E. Snow Load Requirements: In accordance with the Contract Documents.

1.5 PRODUCTS TO BE FURNISHED UNDER OTHER SECTIONS AND INSTALLED UNDER THIS SECTION

A. Section 46 07 13 Packaged Water Treatment Equipment

B. Section 46 33 42 Diaphragm Metering Pump

1.6 PRODUCTS TO BE FURNISHED AND INSTALLED UNDER THIS SECTION

A. Materials specified in the Contract Documents and under this Section including, but not limited to:

1. Conduit and Fittings

2. Wire and Cable:

a. Low-Voltage Wire and Cable
b. Tray Cable
c. Shielded Tray Cable
d. Instrumentation Cable
e. Telephone Cable

3. Grounding and Bonding

4. Lighting Fixtures and Accessories

5. Safety Switches

6. Wiring Devices

7. Enclosures

8. Control Panels

9. Motor Controller Heater Elements

10. Electric Motors and Accessories

11. Instrumentation

1.7 PRODUCTS TO BE FURNISHED AND INSTALLED BY OTHERS

A. PLC and HMI programming

1.8 SERVICES TO BE PROVIDED UNDER THIS SECTION

A. Interface and coordinate all equipment outages and changeovers with other Contractors under direction of the Owner. Coordinate and provide information and detail as may be requested by the Owner.

1.9 SUBMITTALS

A. Submit the following in accordance with requirements of the Contract Documents.

B. Product Data: Submit data for all equipment provided and as listed below. Include product description, dimensional details, plans and elevations, conduit entrance/stubup locations, manufacturers' installation details and assembly drawings with bills of material. Include wiring diagrams, interconnecting diagrams and foundation loading/weight. Include catalog cuts with ratings, specifications, standards compliance, finish, and enclosure type. Include photometric data for all light fixtures.

C. Safety switches, small distribution transformers, and panelboards.

1. Enclosures and associated equipment.
2. Wire and cables, conduit, wiring devices, pull boxes.
3. Grounding materials.
4. Lighting fixtures and accessories.
5. Provide as-built redlines of all modified control panels at the end of the project.
6. Instrumentation.

D. Inspection and Test Reports: Submit legible shop test results for source testing specified in Part 2 of this Section and legible field test results for source testing specified in Part 3 of this Section.

E. Other: Submit legible interruption of power schedule as requested in below.

1.10 PRODUCT OPTIONS, SUBSTITUTIONS AND EXCEPTIONS

A. Include an itemized list of proposed exceptions with the bid materials and future submittals as they are identified. Identify by page and paragraph where an exception is being taken, accompanied by an explanation of a proposed alternate solution. If the exception is being taken because of incompatibility of specified items, then make a clear statement to that effect.

B. Design requirements in this Section and its references are intended to identify particular features of design having significance to the Owner.

C. Submit product options and substitutions in accordance with the Contract Documents. Product options and substitutions require Engineer approval. Refer to the requirements for exceptions, above.

1.11 QUALITY ASSURANCE

A. Refer to Contract Documents for General Quality Assurance requirements.

B. Electrical Components, Devices and Accessories: Listed and labeled as defined in ANSI/NFPA 70, Article 100, by a testing agency acceptable to the Authority Having Jurisdiction, and marked for intended use.

C. Test all materials and equipment as required by this Section and standards referenced.

1.12 OPERATION AND MAINTENANCE DATA

A. Refer to the Contract Documents for operation and maintenance manuals submittal requirements.

1.13 WARRANTY

A. Warrant that materials and workmanship or apparatus supplied are in accordance with Contract Document requirements.

1.14 DELIVERY, STORAGE AND HANDLING

A. Ensure equipment and materials are prepared for shipment in accordance with Manufacturers' instructions.

B. Transport, handle, store and protect products, equipment and materials in accordance with Manufacturers' instruction.

C. Seal, store, and handle cables to ensure no damage to the outer covering or insulation from moisture and weather.

D. Replace damaged or defective items with new items.

E. Assume full responsibility for materials furnished by others but installed under this Section, and for their safekeeping, until the completed installation has been approved and accepted.

F. Protect all items from the detrimental effects of weather. Prior to installation, items subject to corrosion under damp conditions, and items containing insulation, such as transformers, conductors, and devices shall be stored indoors.

1.15 STANDARD REQUIREMENTS

A. Perform work according to the following:

1. The Contract Documents.

2. The contents of this Section.

3. The Drawings.

4. The installation and testing instructions of the Manufacturers of equipment or materials supplied for installation, unless the Section or the Drawings call for more stringent requirements.

B. Complete and prepare for use all electrical systems as outlined on the Drawings and in each Specification Section.

C. Furnish all labor and materials necessary for the completion and satisfactory operation of the electrical systems.

D. All materials and installations shall be in strict accordance with the applicable requirements of the NEC and the NESC.

1.16 CLASSIFIED AREAS

A. Classified areas are noted on the Drawings and other Contract Documents. All electrical materials, equipment, and work in these areas shall comply with the requirements of the NEC, applicable Codes, Standards and Recommended Practices of the NFPA and other regulatory bodies as may be invoked, subject to approval by the Authority Having Jurisdiction.

1.17 DRAWINGS

A. The electrical Drawings are diagrammatic. Follow them as appropriate in the actual construction of the facilities and as the work of the other trades will permit.

B. Verify Drawing dimensions and layouts for clearance and interference prior to the commencement of any work.

1.18 OPERATION PRIOR TO COMPLETION

A. If advantageous, operate mechanical or electrical equipment after it is tested, operable and safe. Obtain approval from Engineer prior to doing so.

B. Properly clean all equipment, and complete all punch list items before final acceptance by the Engineer regardless of whether the equipment has or has not been operated.

1.19 SPACE AND EQUIPMENT ARRANGEMENT

A. Determine that the equipment proposed will fit the allotted space. Shop drawings shall show suitable arrangements, which allow for operations, maintenance and the NEC working space.

B. Locate and install equipment readily accessible for operation and maintenance. Engineer reserves the right to require minor changes in locations of equipment, prior to roughing in, without incurring additional costs or changes.

1.20 INTERRUPTION OF EXISTING ELECTRICAL AND OTHER NECESSARY SERVICES

A. Tie–ins, alterations to, or replacement of, existing circuits or equipment shall be scheduled according to requirements listed in the Contract Documents. Prepare a written schedule of dates and time and number of hours needed for all shutdowns and submit to the Engineer for review.

B. Do not interrupt or impede other contractors' operations and work in adjacent areas.

PART 2 PRODUCTS

2.1 MATERIALS

A. All electrical equipment and material shall be new, free of defects, and identified as to suitability for a specific task, environment or application.

B. The Manufacturer's name or trademark and other applicable markings such as voltage, current, wattage or similar ratings shall appear on all installed equipment.

C. Materials and equipment shall be UL or CSA (US or NRTL suffix only) listed and labeled unless the materials or equipment are of a type for which those organizations do not provide a listing or labeling service. In such cases provide materials and equipment acceptable to the local Authority Having Jurisdiction.

D. Electrical equipment used to control and isolate power to machines, and equipment requiring servicing and maintenance, shall include a Lockout/Tagout device as required by OSHA Regulations 29 CFR 1926.417. Examples are manually operated electric circuit breakers and disconnect switches.

E. All electrical equipment specified or shown on the Drawings, and not specifically shown to be furnished and installed by others, shall be furnished and installed by the Contractor.

2.2 CONDUIT AND FITTINGS

A. Conduit:

1. Rigid Galvanized Steel Conduit (RGS): RGS shall comply with the requirements of ANSI C80.1.

2. Electrical Metallic Tubing (EMT): EMT shall comply with the requirements of ANSI C80.3.

3. Liquid-Tight Flexible Steel Conduit: Liquid-tight flexible conduit shall be flexible metal galvanized steel with a sunlight-resistant jacket. The entire assembly shall comply with UL 360.

4. Nonmetallic Conduit (PVC): Nonmetallic conduit shall conform to NEMA TC 8 Type EB and UL Standard 651. Conduit shall be heavy wall type, Schedule 40.

5. Minimum above-grade conduit size for RGS, EMT and flexible metal conduits shall be ¾ inch trade diameter unless otherwise noted on the Drawings. Size 1¼ inch and 3½ inch shall not be used.

6. Minimum below-grade direct burial and in-concrete conduit size for RGS shall be 1-inch trade diameter unless otherwise noted on the Drawings.

7. Minimum below-grade and in-concrete conduit size for PVC shall be 2-inch trade diameter unless otherwise noted on the Drawings.

B. Fittings:

1. Fittings for RGS, EMT or flexible metal conduit shall be zinc coated and in compliance with UL 514 and NEMA FB 1.

2. Fittings for PVC conduit shall be in accordance with fittings and conduit bodies shall be in compliance with NEMA TC 9.

3. Fittings shall be sized sufficiently so as not to exceed the Manufacturer's recommendations for minimum bend radius for cables contained within.

C. Wireway: Wireway shall be rated NEMA 12 unless otherwise noted on the Drawings.

2.3 WIRE AND CABLE

A. Low-Voltage Wire and Cable:

1. Low-voltage wire and cable used for power, control and lighting shall be single conductor copper, stranded, rated 600 V, types THHN/THWN or XHHW-2 insulation according to NEMA WC 7 or NEMA WC 8, sized as shown on the Drawings or as required by the load and the NEC.

2. Minimum wire size shall be No. 12 AWG for power circuits, No. 14 AWG for lighting circuits and No. 16 AWG for control circuits.

3. All wire and cable shall have a minimum temperature rating 75 deg F.

B. Tray Cable:

1. Multi-conductor power cables and control cables shall be type TC rated 600 V for use in wet and dry locations in accordance with the NEC.

2. The power cables shall contain a bare copper ground wire sized according to NEC requirements.

3. The conductors shall be copper per ASTM B3, stranded according to ASTM B8, sized as shown on the Drawings.

4. Conductor insulation shall be types THHN/THWN or XHHW-2 according to NEMA WC 7 or NEMA WC 8.

5. The overall jacket shall be heavy-duty hypalon or chlorinated polyethylene (CPE) having high resistance to tearing, punctures, moisture, ozone, oil, sunlight, and chemicals.

6. All wire and cable shall have a minimum temperature rating of 75 deg F.

C. Shielded Tray Cable:

1. Multi-conductor shielded power cables shall be type TC rated 600 V for use in wet and dry locations in accordance with the NEC.

2. The power cables shall contain three insulated power conductors and one insulated ground conductor.

3. The conductors shall be copper per ASTM B3, stranded according to ASTM B8, sized as shown on the Drawings.

4. Conductor insulation shall be types THHN/THWN or XHHW-2 according to NEMA WC 7 or NEMA WC 8.

5. The shield shall be a 10-mil-thick copper corrugated tape applied longitudinally over a clear polyester tape.

6. The overall jacket shall be heavy-duty hypalon or chlorinated polyethylene (CPE) having high resistance to tearing, punctures, moisture, ozone, oil, sunlight, and chemicals.

D. Instrumentation Cable:

1. Shielded Twisted-Pair Cable:

a. Description: A pair of individual conductors, twisted and triplexed with a copper drain wire and an aluminum Mylar tape applied over the triplexed group, with an overall jacket.

b. Individual Conductors: Tinned stranded copper.

c. Insulation Voltage Rating: 300 V.

d. Insulation Material: High-density polyethylene (HDPE).

e. Minimum conductor size shall be No. 18 AWG or as shown on the Drawings.

f. Shielding: Overall aluminum Mylar tape.

g. Overall Jacket: HDPE or CPE.

2. Multi-Conductor Cable:

a. Description: Multi-conductor instrument cable shall consist of a bundle of individually shielded twisted pairs as specified above, bundled together with a copper drain wire and an overall aluminum Mylar tape shield covered by an overall jacket.

b. Overall shield: Aluminum Mylar tape.

c. Overall jacket: HDPE or CPE.

3. Identification: All instrument cable shall be labeled and marked as required by the NEC.

4. All instrumentation cable shall be type TC rated 600 V for use in wet or dry locations.

5. All instrumentation cable shall have an overall jacket having a high resistance to tearing, punctures, moisture, ozone, oil, sunlight, and chemicals.

E. Telephone Cable:

1. Copper wire multi-paired, solid conductor, polyethylene jacket, with quantity of pairs as shown on the Drawings.

2. Each pair shall be Category 3, 24 AWG.

3. Cable shall be suitable for overhead and cable tray installation.

F. Coaxial Cable: RGS type, bare copper covered steel conductor with polyethylene insulation, conductive layer, tinned copper braid shield and polyethylene jacket.

2.4 GROUNDING AND BONDING

A. Rod Electrode:

1. Material: Copper-clad steel ground rod.
2. Diameter: ¾ inch.
3. Length: 8 feet.

B. Mechanical Connectors:

1. Description: Bolted pressure clamp-type connectors.
2. Material: Silicon Bronze.

C. Grounding Connections: Connections shall be made by the exothermic process or high-strength compression connectors as shown on the Drawings.

D. Wire:

1. Description: Bonding and grounding conductors sized No. 8 AWG and smaller shall be solid, bare copper complying with ASTM B1. Bonding and grounding conductors sized No. 6 AWG and larger shall be Class B, stranded copper complying with ASTM B8.

2. Material: Copper, sized as shown on the Drawings.

2.5 LIGHTING FIXTURES AND ACCESSORIES

A. Luminaires:

1. Furnish lighting fixtures as shown on the Drawings. All fixtures shall be new and UL listed.

2. All luminaires and lighting equipment shall be delivered to the project site complete with suspension accessories, canopies, casings, sockets, holders, reflectors, diffusing materials, and ballasts, all wired and assembled.

B. Lamps: Furnish energy-saving lamps for lighting fixtures where available or as specified on the Drawings.

C. Ballast:

1. All ballasts shall meet the requirements of ANSI C82.4 or ANSI C82.1, where applicable.

2. Ballasts for high-intensity discharge lamps shall be high power factor, CBM (Certified Ballast Manufacturers) labeled, constant wattage autotransformers, rated for -20°F starting. Cold start and restart amperage shall not exceed operating amperage. Ballasts shall start lamps and operate satisfactorily at normal line voltage ±10 percent. All ballasts shall have individual fuse protection.

3. Fluorescent fixtures shall be supplied with electronic, energy-saving ballast where available. All ballast shall have individual fuse protection.

D. Accessories: Furnish all material and suspension accessories required for installation of the lighting fixtures.

2.6 CONTROL PANELS

A. Install control panels provided by others.

1. Mark up shop drawings to indicate any field modifications. Provide mark ups to Engineer at conclusion of project.

2.7 ENCLOSURES

A. Junction boxes shall be NEMA 4X, NEMA 4, NEMA 12 or as shown on the Drawings. Terminal strips shall be tubular screw with pressure-plate types, sized as shown on the Drawings, suitable for mounting on mounting rails. Terminal block circuit breakers shall be thermal-magnetic types, sized as shown on the Drawings. Provide nameplates for panel cover as shown on the Drawings. Nameplates shall be engraved laminated plastic, black with white surface, fastened to the cabinet surfaces with self-tapping stainless-steel machine screws or permanent adhesive.

2.8 WIRING DEVICES

A. Convenience Receptacles:

1. Rating: 120 V.

2. Source of Supply: Panelboard, with no more than eight receptacles per 20-ampere circuit breaker, unless conditions dictate otherwise. Receptacles shall not be connected to same circuits as lighting fixtures.

3. Locations: Furnish as shown on Drawings.

4. Description:

a. GFCI Receptacles: Specification grade, duplex, 15-A, 2-pole, 3-wire, ivory, NEMA type 5-15.

b. Cover Plates: Plates shall be cast material with a neoprene gasketed spring door for damp locations.

c. Outlet Boxes: Surface mount cast box with a ¾-inch hub.

d. Mounting Height: 4'-6" in process areas above grade or floor unless noted.

e. Mounting Height: 12" to bottom in office areas above grade or floor unless noted.

f. Convenience Receptacles: 20-A, 2-pole, 3-wire duplex, ivory (NEMA 5-20) with cover to match unless indicated otherwise in the Drawings.

B. Terminal Blocks and Accessories:

1. Terminal Blocks and Accessories shall be UL listed and comply with the requirements of NEMA ICS 4.

2. Terminal blocks shall be suitable for copper conductor connections.

2.9 SAFETY SWITCHES

A. Materials:

1. All materials and equipment shall meet the requirements of NEMA KS 1, ANSI/NFPA 70 and UL 98.

2. Switches shall be quick-make, quick-break type, load interrupter knife switches, heavy-duty, enclosed, fusible or non-fusible rated for voltage, ampere, or ampere and horsepower, as indicated on the Drawings.

3. Enclosures: NEMA type 3R for outdoor, NEMA 4X, NEMA 4, NEMA 12 for indoors or as shown on the Drawings.

4. Externally operable handle interlocked to prevent opening front cover with switch in ON position and interlock bypass for testing purposes. Handle lockable in OFF and ON positions with room for up to three padlocks. All switches shall have switchblades, which are fully visible in the OFF position when the switch door is open. Fuse clips, designed to accommodate Class K fuses.

5. Fuses shall be as indicated on the Drawings.

2.10 INSTRUMENTATION

A. Provide instrumentation in accordance with the Instrument Schedule drawing.
B. Install instrumentation provided by others.

2.11 SOURCE QUALITY CONTROL

A. Provide Manufacturers' standard shop test reports for all equipment and devices provided under this Section.

PART 3 EXECUTION

3.1 GENERAL

A. Install equipment according to the Manufacturers' instructions, the Drawings, and Specification Sections.

B. Inspect equipment for physical damage and report any deficiencies immediately to Engineer. Compare equipment nameplate information with latest Drawings and report discrepancies to Engineer

C. Work shall be performed by qualified electricians, conforming to the best-accepted trade practice and with the proper tools and shall conform to the requirements of the Drawings, Specification Sections and the NEC.

D. Electrical clearance at all voltage levels shall be made according to the requirements of the NEC and the NESC.

E. The installation shall conform to structures, preserve clearances, avoid obstructions, maintain headroom and keep openings and passageways clear.

F. Exact locations, distances, and levels shall be governed by field conditions.

G. Phase Rotation:

1. The required order of phase rotation for the project shall be phase A, phase B, phase C, with the voltage reaching maximum amplitude in that order.

2. When facing circuit breakers, motor starters, or panelboards, the phase conductor to terminal connection shall be A-B-C, with A phase on the left and C phase on the right. Bus bars in the equipment shall be in the order A-B-C from front to back and top to bottom.

3. All motors shall be bumped to check for correct direction of rotation prior to further testing.

4. Wires/cables shall be phase marked at source and load ends.

5. When phase reversing is required, record and change at the motor end.

H. Support for Equipment:

1. Provide all necessary supports for equipment installed under this Section and in accordance with the Drawings. Supports shall include steel frames, plates, brackets, racks, and other shapes of adequate size, fastened with bolts, screws, or by welding. The use of any other material for support shall require the Engineer's approval.

2. Thoroughly clean metal surfaces and paint in accordance the Contract Documents.

3. Provide all supports, foundations, curbs, and stands for other electrical equipment, which are not shown on the Drawings, but necessary for proper installation.

I. Cutting and Patching:

1. Avoid cutting into the work of others by using sleeves, inserts, chases and similar openings necessary for installation of the electrical work. The Contractor shall be responsible for correctly sizing and locating the work, and shall furnish all sleeves and inserts.

2. Properly reinforce and patch all cutting, welding, or drilling of concrete or structural members to match as nearly as possible the surrounding work. Secure approval of the Engineer before cutting, welding, or drilling any concrete or structural member.

3. Coordinate equipment and raceway locations to openings in walls, floors, and equipment pads.

4. All cutting and patching shall be done by individuals skilled in the appropriate building trade.

5. Restore all surfaces to match adjacent surface.

J. Identification: Furnish and install engraved nameplates identifying control stations, safety switches, individual motor starters, panelboards, transformers, and other electrical equipment not identified by factory nameplates. Nameplate material shall be 1/16 inch-thick black and white laminated phenol resin. The engraving shall extend through a semi-matte white surface to give black letters of adequate readability. The height of letters and figures shall be approximately 1/8 inch for component nameplates and 7/16 inch for position nameplates. Furnish a list of nameplate legends, descriptions, types, and sizes for approval by the Engineer prior to procurement.

K. Field Quality Control: Perform all quality control testing unless otherwise indicated. The types and frequency of testing, and reporting of test results shall be according to this Section and the Manufacturer's instructions. Refer to the Contract Documents for detailed field quality control requirements by system.

L. Electrical Testing:

1. General: Upon completion and before acceptance of the work, perform complete functional operating tests of all systems, optionally in the Engineer's presence. Demonstrate that all systems and equipment function as intended according to the requirements of this Section and other Sections. Report defective systems or materials found during acceptance tests directly to the Engineer. Maintain written records of all tests. Submit certified test reports to the Engineer in accordance with Contract Documents.

2. Testing and Adjusting: The following requirements are supplementary to test requirements specified for individual equipment or systems under this and other Sections.

   a. Schedule all testing for approval by the Engineer.

      1) Notify the Engineer at least one week in advance of any testing.

      2) Complete test and inspection records shall be made and incorporated into a report for each piece of equipment tested.

         a) Record all readings taken.
         b) Submit copies to Engineer for review as specified in Part 1.

   b. Furnish calibrated meters, instruments, temporary wiring and labor necessary to perform all required tests and adjust equipment and wiring installed and connected in this work.

   c. Verify correct polarity and phasing, freedom from grounds and shorts, and proper equipment operation.

3. Test each piece of equipment as specified in other Sections.

4. Perform function-operating tests after completing the equipment tests as indicated above, to demonstrate the proper interaction of all sensing, processing, and action devices.

5. Test all interlocks, safety devices and fail safe functions in addition to the design function.

6. Propose methods to initiate the sensing device by physical stimuli and quantitatively measure the end result or output.

M. Start-Up Assistance: Provide start-up assistance to the Engineer in accordance with Contract Documents. This start-up assistance may include, but is not limited to, inspection, testing, pre-operational checkout, trouble shooting and engineering support necessary to bring the facility into full operation.

N. Adjusting and Cleaning:

1. Keep premises clean and orderly during construction.

2. Keep all equipment nameplates clean for easy reading.

3. Upon completion of work, clean all equipment and remove surplus material and rubbish relating to electrical work, leaving the work area neat and clean.

3.2 CONDUIT AND FITTINGS

A. General Installation:

1. All conduit and fittings shall be installed in a neat and workmanlike manner according to this Section, the Drawings, the NEC, and the Manufacturer's written instructions.

2. Coordinate conduit installation with the other trades to avoid interference.

3. Conduit entrances through exterior concrete walls or below grade footings shall be made watertight. Provide pipe sleeves in the concrete with 1/2-inch minimum clearance around the conduit and an entrance seal.

4. In no case shall any conduit or body be mounted "hard-up" against structural members, building siding or concrete. Stand-offs shall be provided which allow a minimum of 1/4" free air space between the conduit or body and the surface to which it is being mounted.

5. In no case shall it be acceptable to use any conduit, body or other part of any raceway system to establish ground continuity or bonding extension.

B. Application:

1. RGS:

All exposed conduits.

2. PVC schedule 40:

All embedded and buried conduits

3. Make electrical connections to motors and other equipment subject to vibration or movement with liquid-tight flexible steel conduit.

4. Connectors terminating flexible conduit shall be insulated, watertight, and shall meet UL requirements for positive ground continuity.

C. Exposed Conduit Installation:

1. Route exposed conduits parallel or perpendicular to structure lines with right-angle turns and standard bends.

2. Supports: Conduit and raceways shall be supported in accordance with NEC Chapter 3.

3. Rigidly maintain and fasten exposed conduit to structural steel using clamps or devices manufactured for the purpose. Banks of conduits (two or more conduits) shall be installed on galvanized, pre-formed steel channel supported from the building or structural members and clamped with steel channel conduit clamps. Single conduits may be fastened to wood or concrete structures with one-hole conduit clamps and clampbacks.

4. Rigidly brace conduit supports at the first and last support of conduit runs where a vertical or horizontal direction change occurs, so that wire may be pulled without damaging the conduit system.

5. Support conduits and equipment independently. Conduits shall not be supported from piping or pipe supports unless shown otherwise on the Drawings.

6. Obtain written permission from the Engineer prior to welding to or drilling structural members.

D. Rough-In Work:

1. Field Bends: Make field bends with standard tools and equipment manufactured specifically for conduit bending.

2. Conduit Sizing: Where conduit size is not indicated on the Drawings, size according to the NEC for the number and sizes of wires to be installed.

3. Liquid-Tight Installation: Liquid-tight flexible steel conduit shall be installed as follows:

4. Limited to connections less than 36 inches in length.

5. Bonded per NEC requirements.

6. Conduit Expansion Joints: Provide conduit expansion joints with bonding conductor at building expansion joints and wherever necessary to compensate for thermal expansion and contraction of the conduit or building. Expansion fittings shall be approved for the use intended and shall include a copper-bonding jumper.

7. Install pull fittings or boxes in accessible locations to facilitate pulling wire and cables. Maximum distance for straight runs shall not exceed 200 feet.

8. Install drain fittings in the vertical drops of outdoor, above grade conduit runs at the point at which the conduits enter control panels and other similar enclosures.

9. Secure conduit to all equipment enclosures internal and external to the facility, not furnished with threaded hubs or bases, with conduit hubs and insulating ground bushings on the inside of the enclosure.

E. Below Grade Conduit, General

1. Conduits shall slope at least three inches per 100 feet and be arranged to drain to handholes or cable vaults. Where conduits must be tapped, provide drain tees in a coarse gravel bed.

2. Terminate indoor conduit stub-ups with a coupling three inches above the floor for extension or for using seal fittings. The exception is for conduits under major equipment, which may terminate with a coupling flush with the floor.

3. Review all drawings and vendor data of the area and equipment concerned to avoid interferences, and then install the conduits in a suitable position.

4. Above grade conduit extensions shall be RGS or EMT, as required by the area, unless indicated otherwise on the Drawings. Provide below grade PVC conduits with approved adapters for connection to the metal conduit. Install adapters below grade, in the concrete envelope if applicable.

F. Conduit in Slab

1. Conduits larger than 1 inch shall not be installed in structural concrete slabs unless approved in writing, or shown on the Drawings.

2. Conduit shall not interfere with the proper placement of principal concrete reinforcement.

3. Conduit shall be placed between the upper and lower layers of reinforcing steel, where applicable.

G. Conduit in Duct Banks or Earth

1. A minimum of 12 inches of separation between conduit and hot water or steam lines shall be maintained. Locate the top of the conduit envelope a minimum of 36 inches below grade. Conduit envelopes shall be above water mains, sewers and gas lines.

2. Reinforce sections of duct banks installed under railroads and roadways, crossing disturbed soil, and crossing open trenches, such as for sewers or water mains, with steel bar.

3. The concrete envelope surrounding the structure of conduits shall have a minimum thickness of three inches on the top, bottom, sides and between conduits and as indicated by NEC. Where reinforced duct sections are required, as under roadways, increase and reinforce the thickness of the concrete envelope adequately for the specific truck loading. Truck loading will be provided by the Engineer upon request.

4. After concrete has set, backfill and compact fill to a depth of 10 to 12 inches above top of duct bank. Install a continuous warning strip of approved six-inch wide metal-foil-backed plastic tape, detectable type, colored red with suitable warning legend describing electrical lines. Continue backfill and compacting in accordance with the Contract Documents.

5. Duct banks shall have concrete dyed red.

H. Field Quality Control: Inspect conduit and fittings for proper installation, connections, fitting tightness, and support.

3.3 WIRE AND CABLE

A. Examination:

1. Verify that any mechanical work likely to damage wire and cable has been completed.
2. Verify that conduit systems and wireways are ready to receive cable.

B. General:

1. Complete and clean conduit systems and wireways before pulling in wires or cables.

2. Do not install cables in conduit if the ambient temperature of the work area is below the cable Manufacturer's recommended minimum handling temperature.

3. Install power conductors continuous from termination to termination. When necessary, make splices and taps only in junction boxes or terminal boxes. Submit location for review by Engineer.

4. Use cable-pulling lubricants when pulling cables. The type of lubricants shall be suitable for the insulation involved. Cables shall be pulled directly from reels into the conduit raceway. Do not lay conductors out on the ground or triplex them prior to pulling into the raceway system.

5. Pulling stresses applied to conductors shall not exceed the Manufacturer's limitations.

6. Avoid parallel runs of signal cables next to noise generating equipment whenever possible. However, if parallel runs cannot be avoided, maintain the following minimum spacing between power cables and signal cables:

Parallel Power Wiring Capacity	Minimum Separation from Signal Cables
120 V, up to 10 A	12 inches
120 V, 11 A to 49 A	18 inches
240 V, up to 50 A	18 inches
240 V, 51 A to 199 A	24 inches
480 V, up to 200 A	24 inches

Crossovers that bring power and signal cables into close proximity shall be made at right angles.

C. Preparation:

1. Use swab to clean conduits of debris before pulling cables.

2. Do not install cables until it has been verified that cable splicing and testing can proceed immediately thereafter.

3. Do not leave conduit systems and enclosures open or wires exposed to weather or mechanical hazards longer than necessary.

D. Installation:

1. Wire and cable shall be installed in a neat and workmanlike manner and according to this Section, the Drawings, the Manufacturer's written instructions and the NEC.

2. Cable routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

3. Install a green insulated copper-grounding conductor, No. 12 AWG minimum, with each electrical circuit, sized according to NEC requirements or as shown on the Drawings.

4. The 600-V instrument cable shall be installed to preclude kinking, excess tension, and crushing of the insulation and shielding.

5. Low-voltage conductors No. 8 AWG and larger shall be terminated or spliced with compression connectors except where clamp or pressure terminals are part of the connected equipment. Conductors smaller than No. 8 AWG used in lighting or HVAC may be spliced using twist-on connectors at junction points.

6. Use pre-insulated compression connectors for wiring 600 V or less.

7. Terminate wiring for control, instrument and communication systems only on terminal blocks in designated terminal boxes or approved enclosures. There shall be no more than two conductors per terminal, including strap-type jumpers.

8. Where possible, color-code No. 6 AWG and smaller wire by the color of the insulation covering. Wires larger than No. 6 AWG may be color-coded using wrap-around markers and phase tape.

9. Instrumentation Wiring: Minimize the number of splices in shielded signal wires and cables. Make splices in suitable terminal boxes with screw-type terminal blocks where required. Soldering shall not be acceptable. Provide terminals for each active and spare pair in multiconductor cables. Ground the cable shield and make it electrically continuous throughout the entire run. Ground the overall cable shield at the panel end only.

10. Splicing of Wire: If splicing is necessary, it shall be done in an accessible pull, junction or outlet box.

11. Splices shall provide a firm mechanical and electrical connection.

12. The insulation value of the splice shall equal the conductor insulation.

13. The conductor shall be inserted full depth into a pressure lug.

    a. Wire nuts shall be used at taps to lighting fixtures.

    b. Termination or splice devices shall be approved for use with the conductor to be installed.

    c. Splices shall be indicated on the Record Drawings.

14. Splices and Connection to Devices: A minimum of 8 inches of conductor shall be left in boxes.

15. Avoid abrasion and other damage to cables during installation.

16. All wire and cable installed shall be listed by UL for the specific type of installation (e.g., conduit, duct, aerial and similar items) as shown on the Drawings.

17. The bending/training radius of insulated wire or cable shall not be less than the minimum recommended by the Manufacturer.

E. Identification:

1. Color Coding: Grounded conductors and grounding conductors shall be color coded according to the NEC.

a. Phase conductors for three-phase feeders and motor branch circuits shall be color coded as follows:

1) 120/208 Volt:

Phase A:	Black.
Phase B:	Red.
Phase C:	Blue.
Neutral:	White.
Ground:	Green.

2) 277/480 Volt:

Phase A:	Yellow.
Phase B:	Orange.
Phase C:	Brown.
Neutral:	Gray.
Ground:	Green.

b. Conductors for 120/240 V single-phase feeders and branch circuits shall be color coded as follows:

Phase 1:	Black.
Phase 2:	Red.
Neutral:	White.
Ground:	Green.

c. Conductors for analog systems shall be color-coded as follows:

Positive:	Black
Negative:	White
Shield:	N/A
Ground:	Green with yellow stripe

d. Where insulation pigmentation or coding is not available for large conductor sizes, use a colored plastic tape and wrap in a spiral half-lap manner to identify the exposed conductors.

e. Control cable color-coding shall comply with NEMA WC 7, Appendix K, Table K-2.

f. Color-code otherwise unidentified conductors with self-adhesive wrap-around markers at each splice or terminated end, and at all locations where the conductor is visible and accessible.

2. Wire and Circuit Identification

a. Power and feeder wires shall be uniquely identified at termination points. Tags shall be solid or heat-shrink sleeve type with machine-printed identification symbol. Adhesive or individual-letter type tags may only be used with prior approval of the Engineer.

b. Signal, control, and instrument wires shall be identified at all termination and splice points. Identify as shown on the Drawings. Tags shall be solid or heat-shrink sleeve type with machine-printed identification symbol. Adhesive or individual-letter type tags may only be used with prior approval of the Engineer.

F. Field Quality Control:

1. Low-Voltage, 600 V Maximum, Cables and Wires

a. Perform Visual and Mechanical inspection except for thermographic survey per NETA.

b. Perform Electrical Tests per NETA. Test values per NETA.

c. Submit testing and inspection documentation in accordance with above submittal requirements and the Contract Documents.

3.4 GROUNDING AND BONDING

A. Examination: Verify that final backfill and compaction has been completed before driving rod electrodes.

B. Installation:

1. Install products in accordance with Manufacturers' instructions.

2. Establish a grounding electrode system in accordance with Chapter 2 of the NEC. Provide interconnection of grounding electrodes listed in the NEC, where they exist, with the following additional requirements:

a. If specified, install driven ground rods connected by bare copper wire located as shown on the Drawings. The top of ground rods shall be a minimum of 2-1/2 feet below finished grade.

b. If specified, the main cable of a ground ring shall be No. 4/0 AWG unless indicated otherwise on the Drawings, installed a minimum of 2-1/2 feet below grade. Taps shall be minimum No. 2 AWG copper cable unless indicated otherwise on the Drawings.

c. Coordinate site activities with other Contractors to ensure concrete-encased electrodes within foundations and footings are captured within the grounding electrode system.

3. All below grade connections shall be exothermic. Make above-grade connections to motors and equipment using bolted pressure clamp-type connectors. Connections to building steel and structures shall be exothermic or as indicated on the Drawings.

4. Where structures or equipment requiring grounding are not available at time of installation, bring the buried ground leads or taps near the proposed terminal point. Provide a 6-foot coil, protected and tagged for identification.

5. Equipment remote from the grounding electrode system may be grounded by separate grounding electrodes and conductors to comply with NEC requirements.

6. Connect all non-current carrying metal parts of electrical equipment and installations to the grounding electrode system as required by the Drawings and the NEC. These shall include, but are not necessarily limited to, building structural columns, lightning arresters, raceways, electrical equipment enclosures, ground bus, transformers and motor frames.

7. In no case shall it be acceptable to use any conduit, body or other part of any raceway system to establish ground continuity or bonding extension. All raceway systems shall contain a suitably sized green-jacketed ground conductor.

8. Grounding jumpers shall be required around all flexible conduit connections for 1-1/2 inch seal-tight flexible conduit and larger. All flexible conduits less than 1-1/2 inch without an integral ground wire shall have a grounding jumper.

9. Connect the grounding system for instrumentation and computers according to the Manufacturer's instructions and in compliance with NEC requirements. Obtain and review this information prior to constructing the grounding system.

C. Field Quality Control:

1. Perform Visual and Mechanical Inspection per NETA.

2. Perform Electrical Tests per NETA. Test values per NETA.

3. Submit testing and inspection documentation in accordance with above submittal requirements and the Contract Documents. Include final grounding electrode system configuration and resistance-to-ground values.

3.5 ELECTRIC MOTORS AND ACCESSORIES

A. Installation:

1. Install and test single-phase and three-phase squirrel-cage induction motors and accessories in accordance with all Manufacturers' instructions including motors shipped separately from driven equipment.

2. Verify all motor data is in accordance with Contract Documents prior to motor installation or connection.

3. Make the electrical connections in accordance with Manufacturer's instructions and the Drawings.

4. Provide grounding and bonding in accordance with this Specification Section and the National Electrical Code.

5. Check for motor free rotation. Check motor rotation for proper shaft direction.

6. Check for proper motor lubrication.

7. Verify that correct quantity and size of all overload and protective devices are provided in each motor starter.

B. Field Quality Control

1. Provide documented receipt inspection to verify that all equipment and materials are of the types and quantity required for the Work, are not damaged nor exhibit other unsatisfactory characteristics, and are stored properly and protected from dirt or moisture.

2. Perform Visual and Mechanical Inspection per NETA and as referenced in this Section.

3. Perform Non-Optional Electrical Tests for Induction Motors in accordance with NETA and as referenced in this Section. Test values per NETA.

4. If any deficiencies are revealed during any tests, such deficiencies shall be brought to the attention of the Engineer.

5. Notice of Testing: Notify Engineer three working days in advance of testing to allow witnessing of tests.

6. Submit testing and inspection documentation in accordance with above submittal requirements and the Contract Documents.

3.6 LIGHTING FIXTURES AND ACCESSORIES

A. Installation:

1. Install in accordance with Manufacturer's instructions.

2. Install and connect all luminaires and lighting equipment and accessories shown on the Drawings to make a completed system ready for service.

3. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement.

4. Bond products and metal accessories to branch circuit equipment grounding conductor.

5. Replace any damaged or defective fixtures, including glassware and plastics or diffusers or lamps, up to time of final inspection and acceptance by the Engineer.

6. Luminaire wiring, supports, and connections shall be in accordance with Article 410 of the NEC. Do not locate splices or taps within an arm, stem or chain. Wire shall be continuous from splice in outlet box of building wiring system to lamp socket or ballast terminal.

7. Install lamps for lighting fixtures as specified on the plans.

B. Field Quality Control:

1. Operate each luminaire after installation. Inspect for proper connection and operation.

2. Provide a minimum of eight hours demonstration of luminaire operation.

3. Submit testing and inspection documentation in accordance with above submittal requirements and the Contract Documents.

C. Adjusting:

1. Aim and adjust luminaires as indicated on the Drawings or as directed by the Engineer.

2. Upon completion of work there shall be a complete set of lamps of proper sizes and types, in good condition, in all fixtures.

D. Cleaning:

1. All fixtures shall be cleaned of dirt and foreign matter before the installation is turned over to the Owner.

2. Clean photometric control surfaces as recommended by Manufacturer.

3. Clean finishes and touch up paint.

3.7 PANELBOARDS

A. Install panelboards in accordance with NEMA PB 1.1. Panelboards shall be plumb, with recessed panelboards flush with wall finishes. Provide supports in accordance with this Section.

1. Panelboards shall be mounted with top six feet above finished floor where obtainable.

2. Provide filler plates for unused spaces in panelboards.

3. Provide typed or neatly printed circuit directories for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.

4. Provide engraved plastic nameplates identifying each panelboard in accordance with the panelboard schedules.

B. Field Quality Control

1. Measure steady state load currents at each panelboard feeder. If necessary, rearrange circuits in the panelboard to balance the phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

2. Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers.

3.8 WIRING DEVICES

A. Installation: The installation of wiring devices shall comply with the NEC, in agreement with this Section and the Manufacturer's written instructions.

B. Identification: Identify and mark all device plates with the panel and circuit number.

C. Field Quality Control: Prior to final acceptance, replace all cracked, chipped, or burned devices or cover plates and damaged devices.

3.9 SAFETY SWITCHES

A. Installation:

1. The installation of switches shall comply with the NEC and the Drawings, this Section, and the Manufacturer's written instructions.

2. Install fuses in fusible disconnect switches.

B. Identification: Switches are to be clearly identified and labeled to indicate power source, voltage, number of phases, and equipment being served.

C. Field Quality Control:

1. Perform Visual and Mechanical Inspection per NETA.

2. Perform Electrical Tests per NETA. Test values per NETA.

3. Submit testing and inspection documentation in accordance with above submittal requirements and the Contract Documents.

END OF SECTION

SECTION 40 05 10 – DUCTILE IRON PIPE AND FITTINGS

PART 1 GENERAL

1.1 SUMMARY

A. The Contractor shall furnish and install ductile iron pipe, fittings, and all appurtenant work, complete in place, all in accordance with the requirements of the Contract Documents. Unless otherwise noted, DIP and fittings shall be Class 350.

B. Pipe Types:

1. CLDI, Cement-mortar Lined Ductile Iron

2. GLDI, Glass Lined Ductile Iron

1.2 REFERENCE STANDARDS

A. ANSI/AWWA C104/A21.4 Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water

B. ANSI/AWWA C105/A21.5 Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids

C. ANSI/AWWA C110/A21.10 Ductile-Iron and Gray-Iron Fittings, 3 in Through 48 in for Water and Other Liquids

D. ANSI/AWWA C111/A21.11 Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings

E. ANSI/AWWA C115/A21.15 Flanged Ductile-Iron and Gray-Iron Pipe with Threaded Flanges

F. ANSI/AWWA C150/A21.50 Thickness Design of Ductile-Iron Pipe

G. ANSI/AWWA C151/A21.51 Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids

H. ANSI/AWWA C153/A21.53 Ductile-Iron Compact Fittings, 3 in. Through 12 in. for Water and Other Liquids

I. AWWA C600 Installation of Ductile Iron Water Mains and Their Appurtenances

J. ASTM C 150 Specification for Portland Cement

K. ASTM B 1000 Standard Practices for Casting Preparation and Test Procedure of Porcelain Enamel-lined Pipe, Fittings, and Valves for Use in the Municipal Wastewater, Sewage, and Water Treatment Industry

1.3 SUBMITTALS

A. Shop Drawings: The Contractor shall submit shop drawings of pipe and fittings in accordance with the requirements in Section 01 33 00 – Submittal Procedures and the requirements of the referenced standards.

B. Certifications: The Contractor shall furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section of the Specification, as specified in the referenced standards and the following supplemental requirements:

1. Physical and chemical properties.
2. Hydrostatic test reports.
3. AWWA- ANSI/NSF61 certification.

C. All expenses incurred in making samples for certification of tests shall be borne by the Contractor.

1.4 QUALITY ASSURANCE

A. Inspection: All pipe shall be subject to inspection at the place of manufacture in accordance with the provisions of the referenced standards, as supplemented by the requirements herein.

B. Tests: Except as modified herein, all materials used in the manufacture of the pipe shall be tested in accordance with the referenced standards as applicable.

C. The Contractor shall perform said material tests at no additional cost to the Owner. The Engineer shall have the right to witness all testing conducted by the Contractor; provided, that the Contractor's schedule is not delayed for the convenience of the Engineer.

D. In addition to those tests specifically required, the Engineer may request additional samples of any material including lining and coating samples for testing by the Owner. The additional samples shall be furnished at no additional cost to the Owner.

PART 2 PRODUCTS

2.1 GENERAL

A. The pipe shall be of the diameter shown, shall be furnished complete with rubber gaskets as indicated in the Contract Documents, and all specials and fittings shall be provided as required under the Contract Documents.

B. Pipe manufacturer shall submit certification that source manufacturing facility has been producing ductile iron pipe of specified diameters, dimensions, and standards for a period of not less than 10 years. Testing of pipe required by AWWA C151/A21.51 shall be conducted in testing and laboratory facilities located in the USA and operating under USA laws and regulations. Pipe shall be handled during manufacture and shipped without nesting (without insertion of one pipe inside another).

2.2 MATERIALS

A. Ductile Iron Pipe: Pipe materials shall conform to the requirements of ANSI/AWWA C151.

B. Cement: Cement for mortar lining shall conform to the requirements of ANSI/AWWA C104; provided, that cement for mortar lining shall be Type II or V. A fly ash or pozzolan shall not be used as a cement replacement.

C. Polyethylene Sleeve: Material for the polyethylene sleeve shall conform to the requirements of ANSI/AWWA C105.

2.3 DESIGN OF PIPE

A. General: The pipe furnished shall be ductile iron pipe, mortar-lined with rubber-gasketed joints as shown.

B. The pipe shall be designed, manufactured, tested, inspected, and marked according to applicable requirements previously stated and except as hereinafter modified, shall conform to ANSI/AWWA C151.

C. Pipe Dimensions: The pipe shall be of the diameter shown. The minimum wall thickness for each pipe size shall be as specified or shown.

D. Fitting Dimensions: The fittings shall be of the diameter shown.

E. Joint Design: Ductile iron pipe and fittings shall be furnished with mechanical joints, push-on joints, flanged joints, and restrained joints as required.

1. Mechanical and push-on joints shall conform to ANSI/AWWA C111/A21.11. 250 pounds per square inch (psi) minimum working pressure.

2. Flanged joints: dimensions per AWWA C110/A21.10 flat face, ductile iron, threaded conforming to ANSI/AWWA C115/A21.15.

3. Grooved End: Rigid type radius cut conforming to AWWA C606, 250 psi minimum working pressure; Victaulic.

4. Restrained joints shall be "Flex-Ring" or "Lok-Ring" Restrained Joint by American Ductile Iron Pipe, "TR FLEX" Restrained Joint by U.S. Pipe, or equal.

F. For bell-and-spigot ends with rubber gaskets, the clearance between the bells and spigots shall be such that when combined with the gasket groove configuration and the gasket itself, will provide watertight joints under all operating conditions when properly installed. The Contractor shall require the pipe manufacturer to submit details complete with significant dimensions and tolerances and also to submit performance data indicating that the proposed joint has performed satisfactorily under similar conditions. In the absence of a history of field performance, the results of a test program shall be submitted.

G. Shop-applied interior linings and exterior coatings shall be held back from the ends of the pipe as shown or as otherwise acceptable to the Engineer.

2.4 SPECIALS AND FITTINGS

A. Fittings for ductile iron pipe shall conform to the requirements of ANSI/AWWA C153/A21.53 or ANSI/AWWA C110/A21.10 for diameters 3-inch through 48-inch and shall have a minimum pressure rating of 350 psi.

2.5 CEMENT-MORTAR LINING (PIPE TYPE CLDI)

A. Cement-Mortar Lining for Shop Application: Except as otherwise provided herein, interior surfaces of all ductile iron pipe, fittings, and specials shall be cleaned and lined in the shop with cement-mortar lining applied centrifugally in conformity with ANSI/AWWA C104. During the lining operation and thereafter, the pipe shall be maintained in a round condition by suitable bracing or strutting. The lining machines shall be of a type that has been used successfully for similar work. Every precaution shall be taken to prevent damage to the lining. If lining is damaged or found faulty at delivery site, the damaged or unsatisfactory portions shall be replaced with lining conforming to these Specifications.

B. The minimum lining thickness shall be double thickness as defined by AWWA C 602.

C. Protection of Pipe Lining/Interior: All shop-applied cement mortar lining shall be given a seal coat of asphaltic material in conformance with ANSI/AWWA C104.

2.6 EXTERIOR COATING OF PIPE

A. Exterior Coating of Exposed Piping: The exterior surfaces of pipe which will be exposed to the atmosphere inside structures or above ground shall be thoroughly cleaned and then given a shop coat of rust-inhibitive primer. Field coating shall be in accordance with the requirements of Section 09 90 00 – Painting and Coating.

B. Exterior Coating of Buried Piping: The exterior coating shall be an asphaltic coating approximately 1-mil thick. In addition, a polyethylene sleeve shall be installed.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPE

A. Handling and Storage: All pipe, fittings, etc., shall be carefully handled and protected against damage, impact shocks, and free fall. All pipe handling equipment shall be acceptable to the Engineer. Pipe shall not be placed directly on rough ground but shall be supported in a manner which will protect the pipe against injury whenever stored at the trench site or elsewhere. No pipe shall be installed where the lining or coating show defects that may be harmful as determined by the Engineer. Such damaged lining or coating shall be repaired, or a new undamaged pipe shall be furnished and installed.

B. All pipe damaged prior to Substantial Completion shall be repaired or replaced by the Contractor.

C. The Contractor shall inspect each pipe and fitting prior to installation to ensure that there are no damaged portions of the pipe.

D. Before placement of pipe in the trench, each pipe or fitting shall be thoroughly cleaned of any foreign substance, which may have collected thereon and shall be kept clean at all times thereafter. For this purpose, the openings of all pipes and fittings in the trench shall be closed during any interruption to the work.

E. Pipe Laying: The pipe shall be installed in accordance with ANSI/AWWA C600.

F. Pipe shall be laid directly on the bedding material. No blocking will be permitted, and the bedding shall be such that it forms a continuous, solid bearing for the full length of the pipe. Excavations shall be made as needed to facilitate removal of handling devices after the pipe is laid. Bell holes shall be formed at the ends of the pipe to prevent point loading at the bells or couplings. Excavation shall be made as needed outside the normal trench section at field joints to permit adequate access to the joints for field connection operations and for application of coating on field joints.

G. Where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the Engineer may change the alignment and/or the grades. Such change shall

be made by the deflection of joints, by the use of bevel adapters, or by the use of additional fittings. However, in no case shall the deflection in the joint exceed the maximum deflection recommended by the pipe manufacturer. No joint shall be misfit any amount which will be detrimental to the strength and water tightness of the finished joint.

H. Except for short runs which may be permitted by the Engineer, pipes shall be laid uphill on grades exceeding 10 percent. Pipe which is laid on a downhill grade shall be blocked and held in place until sufficient support is furnished by the following pipe to prevent movement. All bends shall be properly installed as shown.

I. Cold Weather Protection: No pipe shall be installed upon a foundation into which frost has penetrated or at any time that there is a danger of the formation of ice or penetration of frost at the bottom of the excavation. No pipe shall be laid unless it can be established that the trench will be backfilled before the formation of ice and frost occurs.

J. Pipe and Specials Protection: The openings of all pipe and specials shall be protected with suitable bulkheads to prevent unauthorized access by persons, animals, water or any undesirable substance. At all times, means shall be provided to prevent the pipe from floating.

K. Pipe Cleanup: As pipe laying progresses, the Contractor shall keep the pipe interior free of all debris. The Contractor shall completely clean the interior of the pipe of all sand, dirt, mortar splatter, and any other debris following completion of pipe laying, pointing of joints and any necessary interior repairs prior to testing the completed pipeline.

L. Finish: The pipe shall have smooth dense interior surfaces and shall be free from fractures, excessive interior surface crazing, and roughness.

3.2 RUBBER GASKETED JOINTS

A. Rubber Gasketed Joints:

Buried applications: Immediately before jointing pipe, the bell end of the pipe shall be thoroughly cleaned, and a clean rubber gasket lubricated with an approved vegetable-based lubricant shall be placed in the bell groove. The spigot end of the pipe shall be carefully cleaned and lubricated with a vegetable-based lubricant. The spigot end of the pipe section shall then be inserted into the bell of the previously laid joint and telescoped into its proper position. Tilting of the pipe to insert the spigot into the bell will not be permitted.

Exposed applications: Use full face rubber gasket between pipe flanges, minimum thickness 1/8 of an inch.

3.3 POLYETHYLENE SLEEVE COATING

A. All buried ductile iron pipe shall be polyethylene encased where noted in accordance with the requirements of ANSI/AWWA C105/A21.5.

3.4 INSTALLATION OF PIPE APPURTENANCES

A. Protection of Appurtenances: Where pipe is encased in polyethylene sleeves, buried appurtenances shall also be encased in polyethylene.

B. Installation of Valves: All valves shall be handled in a manner to prevent any injury or damage to any part of the valve. All joints shall be thoroughly cleaned and prepared prior to installation. The Contractor shall adjust all stem packing and operate each valve prior to installation to insure proper operation.

C. All valves shall be installed so that the valve stems are plumb and, in the location, shown.

3.5 PIPELINE TESTING

A. All pipes shall be visually inspected for leaks. Any leaking pipes must be removed or replaced.

END OF SECTION

SECTION 40 05 13 - COMMON WORK RESULTS FOR PROCESS PIPING

PART 1 GENERAL

1.1 SUMMARY

This Section applies to the furnishing and installation of piping inside a building, structure, enclosure and miscellaneous yard piping.

A. Related Sections:

1. Section 05 50 00, Metal Fabrications
2. Section 09 90 00, Painting and Coating
3. Section 33 13 00, Testing and Disinfection of Water Utility Piping
4. Section 40 05 23, Common Work Results for Process Valves

1.2 REFERENCE STANDARDS

A. American Society of Mechanical Engineers (ASME):

1. ASME B1.20.1 Pipe Threads, General Purpose (inch)
2. ASME A13.1 - Scheme for the Identification of Piping Systems.
3. ASME B16.5 Pipe Flanges and Flanged Fittings, Steel Nickel Alloy, and other Special Alloys
4. ASME B16.15 - Cast Copper Alloy Threaded Fittings: Classes 125 and 250.
5. ASME B31.3 - Process Piping.
6. ASME B31.9 - Building Services Piping.

B. ASTM International (ASTM):

1. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
2. ASTM A307 - Specification for Carbon Steel Bolts and Studs, 6,000 psi Tensile.
3. ASTM A325 - Specification for High-Strength Bolts for Structural Steel Joints.
4. ASTM B43 - Standard Specification for Seamless Red Brass Pipe, Standard Sizes.
5. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
6. ASTM B584 - Standard Specification for Copper Alloy Sand Castings for General Applications.
7. ASTM D792 - Test Methods for Specific Gravity and Density of Plastics by Displacement.

8. ASTM D1248 - Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.

9. ASTM D1784 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.

10. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

11. ASTM D2000 - Classification System for Rubber Products in Automotive Applications.

12. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.

13. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.

14. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.

C. American Water Works Association (AWWA):

1. AWWA C200 - Steel Water Pipe - 6 In. (150 mm) and Larger.

2. AWWA C207 - Steel Pipe Flanges for Water Works Service, Sizes 4 in through 144 in.

3. AWWA C219 - Bolted, Sleeve-Type Couplings for Plain-End Pipe.

4. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service.

5. AWWA C510 - Double Check Valve Backflow Prevention Assembly.

6. AWWA C511 - Reduced-Pressure Principal Backflow Prevention Assembly.

7. AWWA C606 - Grooved and Shouldered Joints.

8. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution.

D. American Welding Society (AWS):

1. AWS D1.1 - Structural Welding Code.

E. Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry:

1. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation.

F. NSF International (NSF):

1. NSF 61 - Drinking Water System Components - Health Effects.
2. NSF 372 - Drinking Water System Components - Lead Content.

1.3 COORDINATION

A. Coordinate installation of specified items with installation of valves and equipment.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data:

1. Submit Manufacturer catalog information for each product specified.

C. Shop Drawings:

1. Identification:

a. Submit list of wording, symbols, letter size, and color coding for pipe identification.
b. Comply with ASME A13.1.

2. Provide all necessary dimensions and details on pipe joints, restraints, fittings, fitting specials, valves, appurtenances, design calculations, and material lists.

3. Provide detailed layout, spool, or fabrication drawings which show all pipe spools, spacers, adapters, connectors, fittings, couplings, and pipe supports necessary to accommodate the equipment and valves provided in a complete and functional system.

D. Manufacturer’s Statement: Certifying pipe fabrication and products meet or exceed specified requirements.

E. Welder Certificates: Certify welders and welding procedures employed on Work, verifying AWS and ASME qualification within previous 12 months.

F. Manufacturer Instructions: Submit special procedures and setting dimensions.

G. Source Quality-Control Submittals: Indicate results of shop tests and inspections.

H. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of piping appurtenances.

B. Identify and describe unexpected variations to pipe routing or discovery of uncharted utilities.

1.6 QUALITY ASSURANCE

A. Drawings:

1. Piping layouts shown in the Drawings are intended to define the general layout, configuration, routing, method of support, pipe size, and pipe type. The mechanical drawings are not pipe construction or fabrication drawings. It is the Contractor's responsibility to develop the details necessary to construct all mechanical piping systems, to accommodate the specific equipment provided, and to provide and install all spools, spacers, adapters, connectors, etc., for a complete and functional system.

B. Inspection:

1. All pipe shall be subject to inspection at the place of manufacture.

2. During the manufacture of the pipe, the Engineer shall be given access to all areas where manufacturing is in progress and shall be permitted to make all inspections necessary to confirm compliance with the Specifications.

C. Welding:

1. All welding procedures used to fabricate pipe shall be prequalified under the provisions of ANSI/AWS D1.1.

2. Welding procedures shall be required for, but not necessarily limited to, longitudinal and girth or spiral welds for pipe cylinders, spigot, and bell ring attachments, reinforcing plates and ring flange welds, and plates for lug connections.

D. Welders:

1. Skilled welders, welding operators, and tackers who have had adequate experience in the methods and materials to be used shall do all welding.

2. Welders shall be qualified under the provisions of ANSI/AWS D1.1 by an independent local approved testing agency prior to commencing work on the pipeline.

3. Machines and electrodes similar to those used in the Work shall be used in qualification tests.

4. The Contractor shall furnish all material and bear the expense of qualifying welders.

E. Tests: Except where otherwise specified, all materials used in the manufacture of the pipe shall be tested in accordance with the applicable Specifications and Standards. Welds shall be tested as specified. The Contractor shall perform all tests at no additional cost to the Owner.

1.7 MATERIAL DELIVERY, STORAGE, AND INSPECTION

A. Inspection:

1. Accept materials on Site in Manufacturer's original packaging and inspect for damage.

2. All piping materials, fittings, valves, and accessories shall be delivered in a clean and undamaged condition.

B. Storage:

1. Store materials according to Manufacturer instructions.

2. Store materials off the ground, to provide protection against oxidation caused by ground contact

C. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.

2. Furnish temporary end caps and closures on piping and fittings and maintain in place until installation.

3. Provide additional protection according to Manufacturer instructions.

D. All defective or damaged materials shall be replaced with new materials.

1.8 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 GENERAL

A. All materials in contact with potable water shall conform to ANSI/NSF Standard 61 and meet the “lead free” requirements of the Safe Drinking Water Act amendment, effective January 4, 2014, as per the lead content evaluation procedures outlined in NSF/ANSI Standard 372.1.

1. All fittings shall either be cast or permanently stamped with markings identifying the item as complying with NSF 61 per the requirements of NSF 372 for “lead free”.

2. All brass in contact with potable water shall comply with ASTM B584.

B. Unless specified otherwise or indicated differently in the Drawings, all piping systems and process piping materials shall be as listed in the table below or as shown on the Drawings:

Service	Material
Exposed ≥ 4”	Class 350 Ductile Iron or unless indicated otherwise on the drawings

2.2 FLANGED DUCTILE IRON PIPE AND FITTINGS

A. Centrifugally cast, conforming to AWWA C151 and AWWA Standard C115.

B. Coating: The exterior surfaces of pipe which will be exposed to the atmosphere inside structures or above ground shall be thoroughly cleaned and then given a shop coat of rust-inhibitive primer. Field coating shall be in accordance with the requirements of Section 09 90 00 – Painting and Coatings.

C. Pipe Mortar Lining: Shop-applied NSF 61 cement mortar lining, smoothed finish, complying with AWWA C104.

D. Pipe Thickness Class:

1. Comply with AWWA C115.

2. Class 350, unless shown to be greater in the Plans.

3. Flanged Joints:

a. Flat faced, complying with AWWA C111 and C115, unless otherwise specified.

b. Bolt hole drilling according to ASME/ANSI B16.1, Class 125, or ASME/ANSI B16.1, Class 250, where specified. Flanges shall be attached with bolt holes straddling the vertical axis of the pipe unless otherwise shown.

c. The Contractor shall coordinate with pipe, valve, and fitting suppliers to make certain mating pipe, valve, and fitting flanges match in bolt pattern.

d. Flange joint connections shall not be exposed to test pressures greater than 1-1/2 times their rated working pressure.

e. Gaskets:

1) Full faced, composed of neoprene rubber, 55-65 durometer hardness, 1/8-inch thick. Dimensions shall be per ANSI B16.21.

2) Ring gaskets shall not be permitted.

3) Flange Gasket Manufacturers:

a) Garlock, style 7986
b) Or approved equal

4) Insulating flanged joints:

a) Full faced, conform to ANSI 16.21.

b) Material: Non-asbestos.

c) Suitable for operating and test pressures of the pipe system.

d) Manufacturer:

(1) Garlock GYLON Style 3505 or equal.

B. FITTINGS:

1. Material: Ductile iron, complying with AWWA Standard C110.

a. Fittings conforming to AWWA C153 may be substituted in lieu of AWWA C110 fittings.

b. Fittings shall be flanged as required and shown on the Drawings.

c. All restraint systems and flanged fittings shall be provided with bolts and gaskets as specified herein.

2. Coating and Lining:

a. Coating: The exterior surfaces of pipe which will be exposed to the atmosphere inside structures or above ground shall be thoroughly cleaned and then given a shop coat of rust-inhibitive primer. Field coating shall be in accordance with the requirements of Section 09 90 00 – Painting and Coatings

b. Cement Mortar Lining: Comply with AWWA C104,

3. Following information cast upon fittings:

a. Manufacturer's identification.
b. Country of manufacture.
c. Pressure rating.
d. For bends, number of degrees and/or fractions of a circle.

C. NUTS, BOLTS, AND WASHERS:

1. All bolts shall have heavy hex head with heavy hex nuts.

a. Bolts: 304 Stainless Steel, SST. Comply with ASTM A193.
b. Nuts: 304 SST. Comply with ASTM A194, Grade 2H.
c. Washers: 304 SST. Comply with ASTM F436.

D. General Service Piping:

1. ASTM A53, seamless, Grade B.
2. Schedule: 40, unless indicated otherwise on Drawings.

2.3 COPPER PIPE AND FITTINGS

A. Description:

1. Seamless; ASTM B88.

2. Type:

a. Type L, hard drawn.

b. For pipe under floor slabs, underground or cast in concrete: Type K, annealed, seamless.

B. Joints:

1. Compression.
2. Manufacturer: Mueller Model 110 or equal

C. Dissimilar Metals: See Dielectric Unions specified herein.

2.4 BRASS PIPE AND FITTINGS

A. Pipe: ASTM B43, chrome plated.

B. Fittings:

1. ASTM B584, brass.
2. ASTM B16.15.

C. Joints:

1. Mechanical compression.
2. Threaded: Tapered and smooth threads, ASME B1.20.1 and ASTM B43.

D. Dissimilar Metals: See Dielectric Unions specified herein.

2.5 POLYVINYL CHLORIDE (PVC) WATER PIPE AND FITTINGS

A. PVC Pipe and Fittings:

1. Four-inch diameter and smaller:

a. Pipe: ASTM D1785, Schedule 40.
b. Fittings: ASTM D2466, Schedule 40.
c. Joints: Socket, solvent-welded, ASTM D2855.
d. Materials: ASTM D1784, minimum cell classification 12545-C.

2. Six-inch diameter and larger:

a. Pipe: AWWA C900, Class 235.
b. Fittings: AWWA C111, cast iron.
c. Joints: ASTM D3139, compression gasket ring.
d. Materials: ASTM D1784, minimum cell classification 12545-C.

2.6 FLEXIBLE TUBING

A. Polyethylene thermoplastic tubing:

1. Standard weight, conforming to ASTM D1248 Type 1, Class A, Category 4, Grade E5.

2.7 GALVANIZED STEEL PIPE AND FITTINGS

A. Pipe: Seamless, or electric resistance welded, ASTM A53, Schedule 40.

B. Joints: Threaded.

C. Fittings:

1. Threaded, 150-pound malleable iron, galvanized, ASTM A197 or ASTM A47, dimensions conforming to ANSI B16.3.

2. Unions, 300-pound malleable iron, galvanized with dimensions conforming to ANSI B16.3, brass to iron seat.

3. Thread lubricant shall be Teflon tape or joint compound that is insoluble in water.

D. Buried Service:

1. Galvanized pipes shall be spirally wrapped with polyvinyl chloride or polyethylene pressure sensitive tape, applied with a suitable primer.

2. The wrap shall have a nominal thickness of 20 mils, consisting of either one layer of 20-mil tape or two separate layers of 10-mil tape.

3. Before the primer and wrap is applied, the piping shall be thoroughly cleaned so that all surfaces shall be dry and free of dirt, dust, rust, oil scale, oil, grease, or other foreign matter.

4. Any solvents used shall be totally volatile so as to leave no trace of oil.

5. Weld spatters, burrs, or sharp points and edges shall be removed by chiseling, ball peening or filling.

6. After thorough cleaning, the piping shall be coated with a primer applied in accordance with the Tape Manufacturer's recommendations. Spiral wrappings shall be applied with an overlap of at least 1-inch.

2.8 STAINLESS STEEL TUBING AND FITTINGS

A. Type 316 stainless steel, unless otherwise specified or shown in the Plans.

B. Meet the material standards set forth in ASTM A269.

C. Fittings: ASTM A276 and ASTM A182.

1. Threaded fittings: National pipe thread meeting the requirements of ASME B1.20.1.
2. Compression fittings: Two-ferrule, mechanical grip design.

D. Unions: Provide to facilitate installation and maintenance of tubing.

E. Manufacturer:

1. Swagelock, or equal.

2.9 STAINLESS STEEL PIPE AND FITTINGS

A. Pipe:

1. Size: 4 inches and smaller, schedule 80, type 304, unless otherwise specified.
2. Conforming to ASME B36.19 dimensions.
3. Conforming to ASTM A312 material requirements.

B. Fittings: Conform to ASME B16.11 dimensions and ASTM A182 material requirements.

C. Threads: Conform to ASME B1.20.1.

D. Socket welds: Conform to ASME B16.11.

2.10 FLEXIBLE COUPLINGS

A. Description:

1. Sleeve-type, couplings. Comply with AWWA C219.

2. Minimum design pressure rating: 150 pounds per square inch (psi).

3. Middle Ring: As required for coupling based upon connecting pipe materials, steel, or ASTM A536, ductile iron.

4. Followers: As required for coupling based upon connecting pipe materials, steel, or ASTM A536, ductile iron.

5. Gaskets:

    a. Material: Buna-N.
    b. Comply with ASTM D2000.

6. Bolts:

    a. Buried: Steel.
    b. Submerged: Stainless steel.

7. Center Pipe Stop: Required where shown on the Drawings.

B. Finishes:

1. Buried Couplings, Bolts: Factory epoxy coated.

C. Manufacturers:

1. For ductile iron and steel pipe:

    a. Dresser, Style 38.
    b. Romac, Model 501.
    c. Smith-Blair.

2. For PVC pipe:

    a. Romac, Model 501 or equal.

3. For flanged steel and ductile pipe:

    a. Dresser, Style 128 or equal.

2.11 RESTRAINED FLANGE ADAPTERS FOR DUCTILE IRON PIPE

A. Description:

1. ASTM A536, ductile iron.

2. Flange bolt circles compatible with ANSI/AWWA C115/A21.15.

3. Restraint for the flange adapter shall consist of a plurality of individually actuated gripping wedges to maximize restraint capability. Torque limiting actuating screws shall be used to insure proper initial set of the gripping wedges.

4. Capable of deflection during assembly or permit lengths of pipe to be field cut to allow a minimum 0.6-inch gap between the end of the pipe and the mating flange without affecting the integrity of the seal.

5. Safety factor of 2:1 minimum.

6. Manufacturer:

    a. EBAA Iron, Series 2100 Megaflange or equal.

2.12 FLANGED INSULATING JOINTS

A. Set shall include a full faced gasket, a full-length insulating sleeve for each flange bolt, and two insulating washers and two steel washers for each bolt.

1. Gaskets:

    a. Full-face, comply with ASME 16.21.
    b. Non-asbestos and non-phenolic compressed sheet packing with nitrile rubber binder.
    c. Manufacturer: Garlock, Style 3505, or equal.

2. Insulating sleeves:

    a. G-10 glass epoxy.

    b. Extend the full width of both flanges, except where one flange hole is threaded where the sleeve shall extend through one flange and the gasket.

3. Insulating washers:

    a. G-10 glass epoxy.
    b. One-eighth-inch thickness.

4. Washers:

    a. Buried: Cadmium plated steel.
    b. Submerged: Stainless steel.

B. The complete assembly shall have an ANSI/AWWA pressure rating equal to or greater than that of the flanges between which is installed.

C. After assembly, the joint shall be tested for continuity. Electrical resistance between flanges and between each bolt and each flange shall be not less than 100,000 ohms.

2.13 INSULATING UNION

A. Description:

1. Material: Galvanized malleable iron with a ground joint.

2. Iron pipe threads: Conform to ANSI B2.1.

3. Insulations: Nylon, bonded, and molded onto the metal body.

4. Union: Rated for the operating and test pressures of the pipe system.

5. Joint connections to copper alloy pipe and tube shall be copper solder or threaded brass ground joints.

6. Isolation Barrier: Impervious to water.

2.14 BACKFLOW PREVENTERS

A. Manufacturers:

1. Nibco.
2. Watts.

B. Double Check Valve Backflow Preventer Assemblies:

1. Size: 1/2-inch to 3 inches.

2. Comply with AWWA C510.

3. Materials:

a. Body: Bronze.
b. Internal Parts: Corrosion resistant.
c. Springs: Stainless steel.

4. Check Valves:

a. Quantity: Two, operating independently.
b. Intermediate atmospheric vent.

5. Ball Valves:

a. Type: Full port, resilient seated.
b. Quantity: Two.
c. Operation: Quarter turn.
d. Material: Bronze.

6. Accessories: Strainer and test cocks.

2.15 DISMANTLING JOINT

A. Description:

1. Comply with AWWA C219, where applicable.

2. Self-contained flanged restrained joint fitting, including both flanged components and sufficient harness bars to withstand the imposed thrust.

3. Design: No part of the restraint system extends outside the flange diameter. The internal bore shall match that of the pipe system.

4. Dismantling joints will allow for a minimum of 2 inches of longitudinal adjustment.

5. Furnish as a complete assembly consisting of spigot piece, flange adaptor, tie bars, and gasket.

6. The gasket seal and compression stud and nut arrangement shall be independent of the tie rod restraint system. Tie Rod diameter shall be compatible with the corresponding bolt diameter of the mating flange. The Tie Rod restraint system shall be capable of withstanding the full pressure thrust that the pipe system can develop at no more than 50 percent of the yield strength of tie rod material.

7. Pressure Rating:

    a. Determined by the flange configuration, and all commonly used flanges shall be available.

    b. Design pressure rating shall be equal to or greater than the mating flanges.

    c. Dismantling joints will be specially fabricated to accommodate pressure requirements with ANSI B16.5 or ANSI B16.47 300-pound class flanges, depending on size of dismantling joint.

8. Lining and Coating:

    a. Shop-applied fusion bonded epoxy coating applied by fluidized bed method, complying with the requirements of NSF 61 and AWWA C550 as applicable.

    b. As an alternative, a shop-coat primer suitable for field applied coatings can be supplied.

9. Flanges: Flat-faced, rated to pressure requirements as shown on the Drawings.

    a. Where design pressure is greater than 300 psi, flanges shall conform to ASME B16.5 and ASME B16.47 300-pound class.

B. Materials:

1. Spigot piece: Steel, ASTM A283 Grade C.

2. Flange adaptor:

    a. Up to 12-inch diameter: Ductile iron, ASTM A536 Grade 65-45-12.
    b. Above 12-inch diameter: Steel, ASTM A283 Grade C.

3. Tie bars: ASTM A193 Grade B7 threaded rod with rolled threads.

4. Gasket: EPDM Grade E.

5. Nuts, Bolts, and Washers: Type 304 stainless steel.

C. Manufacturer:

1. Romac or equal.

2.16 PIPE SUPPORTS

A. Floor Support for Pipe:

1. Flanged Pipe Support:

a. Construction:

1) Adjustable vertical pipe support, flange plate, extension pipe from base cup to top collar cup with threaded stud.

2) Bolts directly to flange.

3) Anchorable base plate.

b. Material: Steel, comply with ASTM A36.

c. Finish: Corrosion resistant, electro-galvanized, or prime coated.

d. Manufacturers:

1) Standon - Model S89.

2. Cradle Pipe Support:

a. Construction:

1) Adjustable vertical pipe support with saddle strap, extension pipe from base cup to top collar cup with threaded stud.

2) Anchorable base plate.

b. Material: Steel, comply with ASTM A36.

c. Finish: Corrosion resistant, electro-galvanized, or prime coated.

d. Manufacturers:

1) Standon - Model S92.

2.17 PIPE PENETRATIONS

A. Sleeves for Pipes through Walls and Floors:

1. Material: Galvanized steel.

2. Thickness: Schedule 40.

3. Inside surface of all wall sleeves shall be coated with coal-tar.

4. Annular space between penetrating pipe and wall sleeve shall be filled with an approved permanently flexible sealant.

5. Diameter of wall sleeve shall be as shown in the Drawings.

B. Mechanical Sleeve Seals:

1. Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2. Manufacturer: Link-Seal or equal.

C. Pipes Cast-In Walls and Floors:

1. Material: Ductile iron or steel pipe, as required by the Drawings and the intended service.
2. Diameter: As shown in the Drawings.
3. End Type: As shown in the Drawings.

D. Seep Rings:

1. Material: 3/8-inch-thick steel plate conforming to ASTM A36, unless otherwise noted.

2. Inside diameter: Equal to the outside diameter of the pipe or sleeve to which it is attached plus 1/4-inch.

3. Outside diameter: As shown in the Drawings.

4. Attach to the pipe or sleeve by means of a continuous seal weld located on both sides of the ring.

2.18 PIPE COATINGS

A. See Section 09 90 00, Painting and Coating.

PART 3 EXECUTION

3.1 GENERAL

A. Furnish and install all piping systems shown and specified, in accordance with the requirements of the Contract Documents. Each system shall be complete with all necessary fittings, hangers, supports, anchors, expansion joints, flexible connectors, valves, accessories, heat tracing, insulation, lining and coating, testing, disinfection, excavation, backfill, and encasement, to provide a functional installation.

B. Pipe shall be installed in accordance with good trade practice. The methods employed in handling and placing of pipe, fittings, and equipment shall be such as to ensure that after installation and testing they are in good condition. Should damage occur to the pipe, fitting or equipment, repairs satisfactory to the Engineer shall be made.

3.2 INSTALLATION

A. Buried Piping Systems:

1. Establish elevations of buried piping with not less than 3 feet of cover.
2. Remove scale and dirt from inside of piping before assembly, as may be required.
3. Excavate pipe trench as specified in Section 31 23 17, Trenching.
4. Install pipe to accurate lines, elevations, and grades as shown on the Drawings.
5. Where grades are not shown, pipe shall be laid to grade between control elevations shown on the Drawings.
6. Place bedding material at trench bottom to provide uniform bedding for piping.
7. Level bedding material in one continuous layer not exceeding 6 inches compacted depth.
8. Install pipe on prepared bedding.
9. Route pipe in straight line.
10. Install pipe to allow for expansion and contraction without stressing of pipe or joints.
11. Install shutoff and drain valves at locations as indicated on Drawings and as specified in this Section.
12. Pipe Cover and Backfilling:
    a. Backfill trench as specified in Section 31 23 17, Trenching.
13. All buried non-ferrous piping shall be installed with detectable tracer tape.

a. Tape shall be buried 12 inches above the top of the pipe or as recommended by Manufacturer.

b. Tape shall be continuous and labeled the same as the piping system.

B. Interior Piping Systems:

1. Install non-conducting dielectric connections wherever joining dissimilar metals.

2. Establish elevations of buried piping outside valve vault to obtain not less than 3 feet of cover.

3. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting as specified in Section 09 90 00, Painting and Coating.

4. Install water piping according to ASME B31.9.

5. Install unions downstream of valves and at equipment or apparatus connections.

6. Install brass male adapters each side of valves in copper piped system, solder adapters to pipe.

C. Backflow Preventer Assemblies:

1. Install backflow preventers of type, size, and capacity indicated.
2. Comply with applicable code and authority having jurisdiction.
3. Install airgap fitting on units with atmospheric vent connection.
4. Pipe relief outlet drain to nearest floor drain.
5. Do not install bypasses around backflow preventers.

D. Pipe Supports and Hangers

1. Install pipe supports according to MSS SP-58 and ASME B31.10.

2. All pipe shall be secured in place by use of blocking, hangers, brackets, clamps or other approved methods, and the weight thereof shall be carried independently of pump casings or equipment.

3. Special hangers and supports are shown on the Drawings.

4. The Contractor shall be responsible for determining the location of and providing all additional supports.

5. Hanger supports shall be as noted below with at least one support adjacent to the joint for each length of pipe, at each change in direction and at each branch connection. Sufficient hangers shall be provided to maintain proper slope without sagging. Support spacing shall not exceed Manufacturer’s recommendations, nor as listed below.

Pipe	Maximum Support Spacing (Feet)
Steel Pipe	
Under 3 inches	6
3 inches and Over	12
Cast or Ductile Iron	
Under 4 inches	6
4 inches and Over	12
Stainless Steel and Galvanized Iron	
Under 1-1/2 inches	4
1-1/2 inches to 4 inches	6
Over 4 inches	12
Copper Pipe	6
PVC Pipe	
Under 2-1/2 inches	4
2-1/2 inches and Over	6

6. Spacing of clamps for support of vertical piping shall be close enough to keep the pipe in alignment as well as to support the weight of the piping and contents unless other vertical support is shown, but in no case shall be more than 12 feet.

7. Provide adjustable hangers for all pipes, complete with adjusters, swivels, rods, etc. Size hangers to clear insulation and guide where required, as well as support piping. All rigid hangers shall provide a means of vertical adjustment after erection. Hanger rods shall be machine threaded. Continuous threaded rods will not be allowed.

8. Clevis or band-type hangers (B-Line FIG B3100) or equal shall be provided as required. Strap hangers not permitted.

9. Provide floor stands, wall bracing, concrete piers, etc., for all lines running near the floors or near walls and which cannot be properly supported or suspended by the walls or floors. Pipelines near concrete or masonry walls may also be hung by hangers carried from wall brackets at a higher level than pipe. Hanging of any pipe from another is prohibited.

10. Equipment shall be positioned and aligned so that no strain shall be induced within the equipment during or subsequent to the installation of pipework.

11. When temporary supports are used, they shall be sufficiently rigid to prevent any shifting or distortion of the piping or related work.

E. Pipe Penetrations:

1. Exterior Watertight Entries: Seal with mechanical sleeve seals or grout, as shown in the Drawings.

2. Whenever a pipeline of any material terminates at or through a structural wall or floor, install piping or sleeve in advance of pouring of concrete required for the particular installation.

3. Plastic pipe shall not be cast in concrete or masonry walls.

4. Set sleeves in position in forms and provide reinforcing around sleeves.

5. Size sleeves large enough to allow for movement due to expansion and contraction and provide for continuous insulation wrapping.

6. Extend sleeves through floors 1-inch above finished floor level and caulk sleeves.

7. Pipe other than concrete, to be cast in water-bearing walls or more than 4 feet below grade shall have seep rings.

8. All buried piping entering structures shall have a flexible connection installed less than 2 feet outside the structure line or as close to the wall as practical.

3.3 CLEANING, TESTING, AND DISINFECTION

A. Testing and Disinfection: Piping shall be hydrostatically tested, flushed, and disinfected as specified in Section 33 13 00, Testing and Disinfection of Water Utility Piping.

END OF SECTION

SECTION 40 05 51 - COMMON WORK RESULTS FOR PROCESS VALVES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes basic materials and methods related to valves commonly used for process systems, including pump stations, utility vaults and water & wastewater treatment.

B. Section Includes:

1. Valves.
2. Valve actuators.

1.2 RELATED SECTIONS

A. Section 05 50 00, Metal Fabrications.
B. Section 09 90 00, Painting and Coating.
C. Section 40 05 13. Common Work Results for Process Piping.
D. Section 40 05 52, Process Valves.
E. Section 40 05 57, Actuators for Process Valves and Gates.

1.3 REFERENCE STANDARDS

A. American Water Works Association:

1. AWWA C504 - Rubber-Seated Butterfly Valves, 3 In. Through 72 In.

2. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service.

3. AWWA C541 - Hydraulic and Pneumatic Cylinder and Vane-Type Actuators for Valves and Slide Gates.

4. AWWA C542 - Electric Motor Actuators for Valves and Slide Gates.

5. AWWA C550 - Protective Interior Coatings for Valves and Hydrants.

B. ASTM International:

1. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings.

2. ASTM B584 - Standard Specification for Copper Alloy Sand Castings for General Applications.

C. Manufacturers Standardization Society of the Valve and Fittings Industry:

1. MSS SP-25 - Standard Marking System for Valves, Fittings, Flanges and Unions.

D. National Electrical Manufacturers Association:

1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

E. National Fire Protection Association:

1. NFPA 70 - National Electrical Code (NEC).

F. NSF International:

1. NSF 61 - Drinking Water System Components - Health Effects.
2. NSF 372 - Drinking Water System Components - Lead Content.

1.4 COORDINATION

A. Contractor shall be solely responsible to coordinate Work of this Section with piping, equipment, and appurtenances.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data:

1. Submit manufacturer's latest published literature. Include illustrations, installation and maintenance instructions, and parts lists.

2. Submit valve cavitation limits.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Manufacturer Instructions: Submit installation instructions and special requirements, including storage and handling procedures.

E. Lining and coating data.

F. Valve Labeling Schedule: Indicate valve locations and nametag text.

G. Certification of Valves Larger than 12 inches: Furnish certified copies of hydrostatic factory tests, indicating compliance with applicable standards.

H. Source Quality-Control Submittals: Indicate results of factory tests and inspections.

I. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections, including factory-applied coatings.

J. CLOSEOUT SUBMITTALS

1. Project Record Documents: Record actual locations of valves and actuators.

2. Operation and Maintenance Data: Submit information for valves.

K. MAINTENANCE MATERIAL SUBMITTALS

1. Spare Parts:

a. Furnish one set of manufacturer's recommended spare parts.

2. Tools:

a. Furnish special wrenches and other devices required for Owner to maintain equipment.

b. Furnish compatible and appropriately labeled toolbox when requested by Owner.

1.6 QUALITY ASSURANCE

A. Cast manufacturer's name, pressure rating, size of valve and year of fabrication into valve body.

B. Valve Testing: Each valve body shall be tested under a test pressure equal to twice its design water-working pressure.

C. Certification: Prior to shipment, submit for all valves over 12 inches in diameter, certified, notarized copies of the hydrostatic factory tests, showing compliance with the applicable standards of AWWA, ANSI, ASTM, etc. Valves tested and supplied shall be trackable and traceable by serial number, tagged or otherwise noted on valve, upon arrival to Site.

D. Maintain clearances as indicated on Drawings.

E. Unless otherwise noted, all water works materials provided for the Project shall be new, of first-class quality and shall be made by reputable manufacturers.

F. All material of a like kind shall be provided from a single manufacturer, unless otherwise approved by the Engineer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Store materials according to manufacturer instructions.

1. Store materials in areas protected from weather, moisture, or other potential damage.
2. Do not store materials directly on ground.

C. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.

2. Protect valve ends from entry of foreign materials by providing temporary covers and plugs.

3. Provide additional protection according to manufacturer instructions.

D. Handle products carefully to prevent damage to interior or exterior surfaces.

E. All defective or damaged materials shall be replaced with new materials at no cost to the Owner.

PART 2 PRODUCTS

2.1 GENERAL

A. All materials in contact with potable water shall conform to ANSI/NSF Standard 61 and meet the “lead free” requirements of the Safe Drinking Water Act amendment, effective January 4, 2014, as per the lead content evaluation procedures outlined in NSF/ANSI Standard 372.1.

1. All fittings shall either be cast or permanently stamped with markings identifying the item as complying with NSF 61 per the requirements of NSF 372 for “lead free”.

2. All brass in contact with potable water shall comply with ASTM B584.

2.2 VALVES

A. Description: Valves, operator, actuator, handwheel, chainwheel, extension stem, floor stand, worm and gear operator, operating nut, chain, wrench, and other accessories as required and shown in the Drawings.

B. Operation:

1. Open by turning counterclockwise; close by turning clockwise.

2. Cast directional arrow on valve or actuator with OPEN and CLOSE cast on valve in appropriate location.

C. Valve Construction:

1. Bodies: Rated for maximum temperature and pressure to which valve will be subjected as specified in valve Sections.

D. Connecting Nuts, Washers, and Bolts: 304 Stainless steel.

2.3 PROCESS VALVES

A. As specified in Section 40 05 52, Process Valves.

2.4 VALVE ACTUATORS

A. All valves shall be furnished with manual actuators, unless otherwise indicated in the Drawings and as specified in Section 40 05 57 Actuators for Process Valves and Gates.

2.5 SOURCE QUALITY CONTROL

A. Testing: Test valves according to manufacturer's standard testing protocol, including hydrostatic, seal, and performance testing.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that piping system is ready for valve installation.

3.2 PREPARATION

A. Access: All valves shall be installed to provide easy access for operation, removal, and maintenance and to avoid conflicts between valve operators and structural members or handrails.

B. Valve Accessories: Where combinations of valves, sensors, switches, and controls are specified, it shall be the responsibility of the Contractor to properly assemble and install these various items so that all systems are compatible and operating properly. The relationship between interrelated items shall be clearly noted on shop drawing submittals.

3.3 INSTALLATION

A. Install valves, actuators, extensions, and accessories according to manufacturer instructions.

B. Firmly support valves to avoid undue stresses on piping.

C. Coat studs, bolts, and nuts with anti-seizing lubricant.

D. Clean field welds of slag and splatter to provide a smooth surface.

E. Install valves with stems upright or horizontal, not inverted.

F. Install valves with clearance for installation of insulation and allowing access.

G. Provide access where valves and fittings are not accessible.

H. Comply with Division 40 - Process Integration for piping materials applying to various system types.

I. Valve Applications:

1. Install shutoff and drain valves at locations as indicated on Drawings and as specified in this Section.

2. Install shutoff and isolation valves.

3. Isolate equipment, part of systems, or vertical risers as indicated on Drawings.

4. Install valves for throttling, bypass, or manual flow control services as indicated on Drawings.

J. Disinfection of Water Piping System:

1. Flush and disinfect system as specified in Section 33 13 00, Testing and Disinfecting of Water Utility Distribution.

3.4 FIELD QUALITY CONTROL

A. Valve Field Testing:

1. Test for proper alignment.

2. If specified by valve Section, field test equipment to demonstrate operation without undue leakage, noise, vibration, or overheating.

3. Owner's Representative shall witness all field testing.

END OF SECTION

SECTION 40 05 52 – PROCESS VALVES

PART 1 GENERAL

1.1 SUMMARY

A. The project involves the replacement of a 20" butterfly valve, manual actuator, floor stand, extension stem, and handwheel operator as indicated in the attached drawings.

B. Contractor shall provide and install the valve, actuator, and appurtenances, complete and operable, in accordance with the Contract Documents. The Contractor shall include necessary resources (labor, tools, coordination, etc.) and coordinate such installation with the valve supplier.

C. The butterfly valve shall be used as an isolation/shut-off valve.

D. The provisions of this Section shall apply to all valves and valve actuators except where otherwise indicated. Valves and actuators in particular locations may require a combination of units, sensors, limit switches, and controls indicated in other Sections of the Specifications.

E. Unit Responsibility: A single manufacturer shall be made responsible for coordination of design, assembly, testing, and furnishing of each valve; however, the Contractor shall be responsible to the Owner for compliance with the requirements of each valve section. Unless indicated otherwise, the responsible manufacturer shall be the Manufacturer of the valve.

F. Single Manufacturer: Where two or more valves of the same type or size are required, the valves shall be furnished by the same Manufacturer.

G. The system to be furnished shall be complete and as shown on the plans. Any supporting hardware such as bolts, nuts, universal joints, etc. shall be provided as needed and to suit the existing field conditions. Refer to Section 40 05 57 for requirements on the manual actuator.

1.2 REFERENCE STANDARDS

A. American National Standards Institute (ANSI): Z21.15, Manually Operated Gas Valves for Appliances, Appliance Connector Valves and Hose End Valves.

B. American Society of Mechanical Engineers (ASME):

1. B16.1, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.

2. B16.44, Manually Operated Metallic Gas Valves for Use in Above Ground Piping Systems up to 5 psi.

C. American Society of Sanitary Engineers (ASSE): 1011, Performance Requirements for Hose Connection Vacuum Breakers.

D. American Water Works Association (AWWA):

1. C500, Metal-Seated Gate Valves for Water Supply Service.

2. C504, Rubber-Seated Butterfly Valves, 3 In. (75 mm) Through 72 In. (1,800 mm).

3. C508, Swing-Check Valves for Waterworks Service, 2-In. Through 24-In. (50-mm Through 600-mm) NPS.

4. C509, Resilient-Seated Gate Valves for Water Supply Service.

5. C510, Double Check Valve Backflow Prevention Assembly.

6. C511, Reduced-Pressure Principle Backflow Prevention Assembly.

7. C512, Air-Release, Air/Vacuum, and Combination Air Valves for Waterworks Service.

8. C515, Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service.

9. C550, Protective Interior Coatings for Valves and Hydrants.

10. C800, Underground Service Line Valves and Fittings.

E. American Society for Testing and Materials International (ASTM):

1. A276: Standard Specification for Stainless Steel Bars and Shapes.

2. A48: Standard Specification for Gray Iron Castings.

3. A536: Standard Specification for Ductile Iron Castings.

4. A743: Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application

1.3 SUBMITTAL

A. General: Submittals shall be furnished in accordance with Section 01 33 00 –Submittal Procedures.

B. Shop Drawings: Shop drawings shall contain the following information:

1. Valve name, size, flow coefficient of the valve (Cv) factor, pressure rating, identification number (if any), and specification section number.

2. Complete information on valve actuator, including size, Manufacturer, model number, limit switches, and mounting.

3. Cavitation limits for all control valves.

4. Assembly drawings showing part nomenclature, materials, dimensions, weights, and relationships of valve handles, handwheels, position indicators, limit switches, integral control systems, needle valves, and control systems.

5. Complete wiring diagrams and control system schematics.

6. Valve Labeling: A schedule of valves to be labeled, indicating in each case the valve location and the proposed wording for the label.

C. Owner's Manual: The Owner's Manual shall contain the required information for each valve.

D. Spare Parts List: A Spare Parts List shall contain the required information for each valve assembly, where indicated.

E. Factory Test Data: Where indicated, signed, dated, and certified factory test data for each valve requiring certification shall be submitted before shipment of the valve. The data shall also include certification of quality and test results for factory-applied coatings.

1.4 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.

2. Indicate field measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 PRODUCTS - GENERAL

A. General: All valves shall be new and of current manufacture. All shut-off valves 6 inches and larger shall have actuators with position indicators. Buried valves shall be provided with valve boxes and covers containing position indicators and valve

extensions. Manual shut-off valves mounted higher than 6 feet above working level shall be provided with chain actuators.

B. Valve Actuators: Unless otherwise indicated, valve actuators shall be in accordance with Section 40 05 57 – Actuators for Process Valves and Gates.

C. Protective Coating: The exterior surfaces of all valves and the wet interior surfaces of all ferrous valves of sizes 4 inches and larger shall be coated in accordance with Section 09 90 00 – Painting and Coating. Finish color for valves and valve accessories shall be same as coating system and finish color of connected piping. The valve Manufacturer shall certify in writing that the required coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with these Specifications. Flange faces of valves shall not be epoxy coated.

D. Valve Labeling**:** Except when such requirement is waived by the Engineer in writing, a label shall be provided on all shut-off valves and control valves except for hose bibbs and chlorine cylinder valves. The label shall be of 1/16-inch plastic or stainless steel, minimum 2 inches by 4 inches in size, and shall by permanently attached to the valve or on the wall adjacent to the valve as directed by the Engineer.

E. Valve Testing: As a minimum, unless otherwise indicated, each valve body 4 inches and larger shall be tested hydrostatically to 1.5 times its rated 100 degrees Fahrenheit (F) design water-working pressure, for a period of 5 minutes, without showing any leaks or loss of pressure. In addition, each valve 4 inches and larger shall undergo a functional test to demonstrate satisfactory operation throughout its operating cycle, and a closure test at rated 100 degrees F water-working pressure for a period of 5 minutes to demonstrate tight shut-off. Stem seal leakage shall not be a cause for rejection. All valves 3 inches and smaller shall undergo the Manufacturer's standard test.

F. Certification: Prior to shipment, the Contractor shall submit for all valves over 12 inches in size, certified, notarized copies of the hydrostatic factory tests, showing compliance with the applicable standards of AWWA, ANSI, and ASTM International (ASTM).

G. Valve Marking: All valve bodies shall be permanently marked in accordance with Manufacturers Standardization Society (MSS) SP25 - Standard Marking Systems for Valves, Fittings, Flanges, and Unions.

H. Nuts and Bolts: All nuts and bolts on valve flanges and supports shall be in accordance with Manufacturer’s standards.

I. Warranty of all the valve components shall be one year from startup or 18 months from delivery. The Warranty shall be transferable to the Owner and installing Contractor.

2.2 VALVE ACCESSORIES

A. All valves shall be furnished complete, with all the accessories required, to provide a fully functional and operational system.

B. Buried and Submerged Valves:

1. Provide seals on shafts and gaskets on valve and actuator covers to prevent water entry.

2. Provide totally enclosed actuator mounting brackets with gasket seals.

C. Valve Boxes

1. Provide for buried valves.
2. Three-piece screw type cast iron box and cover.
3. Valve box diameter 5-1/4-inch, length as required for installation.
4. Provide extension stems, complete with operating nuts, as required for installation.

D. Floor Boxes:

1. Provide for valves as shown on Drawings.

2. Cast iron box and cover. Floor boxes shall be painted per Section 09 90 00.

3. Provide valves with extension stems, complete with operating nuts, as required to locate top of operating nuts 2 inches below top of floor box cover.

E. Floor Stands for Valve Actuators:

1. Provide for valves as shown on Drawings.

2. Height above finished floor shall be 36”.

3. Type: Cast Iron or 304 stainless steel.

4. Secure to finish floor with 304 stainless steel hardware and non-shrink grouting requirements.

F. Extension Stems for Valves:

1. Provide for valves as shown on Drawings.

2. Provide with stem coupling and intermediate stem guides with maximum spacing not exceeding 8 feet or L/R not exceeding 200.

3. Type 304 stainless steel.

G.

H. Hardware for Valves:

Provide all 316 SST nuts, bolts or anchor bolts, washers, support brackets, etc. as required.

2.3 SPARE PARTS

A. Where indicated, the Contractor shall furnish the required spare parts suitably packaged and labeled with the valve name, location, and identification number. The Contractor shall also furnish the name, address, and telephone number of the nearest distributor for the spare parts of each valve. All spare parts are intended for use by the Owner, only, after expiration of the guarantee period.

2.4 VALVES

A. Rubber Seated Butterfly Valves (V-100+ Series)

1. General:

a. In full compliance with AWWA C504 and following requirements:

1) Suitable for throttling operations and infrequent operation after periods of inactivity.

2) Elastomer seats which are bonded or vulcanized to the body shall have adhesive integrity of bond between seat and body assured by testing, with minimum 75-pound pull in accordance with ASTM D429, Method B.

3) Bubble-tight with rated pressure applied from either side. Test valves with pressure applied in both directions.

4) No travel stops for disc on interior of body.

5) Self-adjusting V-type or O-ring shaft seals.

6) Isolate metal-to-metal thrust bearing surfaces from flow stream.

7) Valve actuators to meet the requirements of AWWA C504.

8) Buried service operators shall withstand 450 foot-pounds of input torque at fully open and fully closed positions.

9) Provide linings and coatings per AWWA, unless otherwise indicated on Drawings or specified herein.

10) Valves to be in full compliance with NSF/ANSI 61.

11) Operation:

Open counterclockwise, unless otherwise indicated in the Drawings.

Operators shall be of the traveling nut or worm gear, self-locking type and shall be designed to hold the valve in any intermediate position between full open and fully closed without creeping or fluttering.

Buried Valves: All buried valves shall be provided with 2-inch square operating nuts.

In-Plant Service Valves: Valves for in-plant or exposed service shall be furnished with handwheel operators, unless otherwise specified

2. Type V-100 Butterfly Valve, Water Works Service

a. Size: 3 inches to 72 inches

b. AWWA C504, Class 150B

c. Short body type, flanged ends. Flanged end dimensions and drilling comply with ANSI/ASME B16.1, class 125, unless shown otherwise.

d. Cast-iron body, cast or ductile iron disc, Type 304 stainless steel shafts, rubber seat, and stainless steel seating surface

e. Provide fusion epoxy lining in compliance with AWWA C550 and NSF 61.

f. Minimum Pressure Rating:

Twelve-inch (300-millimeter) Diameter and Smaller: 200 pounds per square inch (gauge) (psig).

Sixteen-inch (400-millimeter) Diameter and Larger: 150 psig.

g. Shaft: Self-lubricating, sleeve-type bearings. One-piece, through-shaft construction.

Valve shafts shall be full size for that portion of the shaft extending through the valve bearings, valve disc, and shaft seal.

Any portion of the shaft turned down for any reason shall have fillets with radii equal to the offset to minimize stress concentrations at the junction of the different shaft diameters. The turned down portion of the shaft shall be capable of transmitting the maximum operator torque without exceeding a torsional steel stress of 11,500 pounds per square inch (psi).

h. Seats: Mounted on body for valves 24 inches and smaller; field replaceable (mechanically retained in a machined groove) for valves larger than 24 inches.

i. Packing: Replaceable without dismantling valve.

j. Manufacturers and Products:

1) Valmatic Model 2000-Basis of Design
2) Pratt; Model 2FII
3) GA Industries Series 800

PART 3 EXECUTION

3.1 VALVE INSTALLATION

A. General: All valves, actuating units, stem extensions, valve boxes, and accessories shall be installed in accordance with the Manufacturer's written instructions and as indicated. Valves shall be firmly supported to avoid undue stresses on the pipe.

B. Access: All valves shall be installed with easy access for actuation, removal, and maintenance and to avoid interference between valve actuators and structural members, handrails, or other equipment.

C. Contractor shall coordinate the mounting and routing of the new extension stem and floor stand. The coordination shall also address mounting requirements to the existing or proposed grating support system.

D. Valve Accessories: Where combinations of valves, sensors, switches, and controls are indicated, the Contractor shall properly assemble and install such items so that all systems are compatible and operating properly. The relationship between interrelated items shall be clearly noted on shop drawing submittals.

3.2 FIELD QUALITY CONTROL

A. Tests:

1. Pressure test valves at same time connected piping is tested.
2. Repair leaking joints.

3. Protect parts of valves and actuators that could be damaged by test.

3.3 INSPECTION, STARTUP, AND FIELD ADJUSTMENT

A. The Contractor shall demonstrate that all equipment meets the specified performance requirements. As necessary, an experienced, competent, and authorized service representative of the manufacturer of each valve type shall visit the site to perform the following tasks:

1. Assist the Contractor in the installation of the equipment, as necessary.

2. To inspect, check, adjust if necessary, and approve the installation.

3. To start-up and field-test the valves for proper operation.

4. To perform necessary field adjustments during the test period until the equipment installation and operation are satisfactory to the Engineer.

END OF SECTION

SECTION 40 05 57 - ACTUATORS FOR PROCESS VALVES AND GATES

PART 1 GENERAL

1.1 REQUIREMENTS

A. The Contractor shall provide all valve and gate actuators and appurtenances, complete and operable, as indicated in the Contract Drawings.

B. The provisions of this Section shall apply to all valves and gates, except where otherwise indicated in the Contract Documents.

C. Unit Responsibility: A single manufacturer shall be made responsible for furnishing the Work and for coordination of design, assembly, testing, and installation of the Work of each type of valve and gate; however, the Contractor shall be responsible to the Owner for compliance with the requirements of each valve and gate section. Unless otherwise indicated, the single manufacturer shall be the Manufacturer of the valve or gate.

D. Single Manufacturer: All electric actuators supplied will be from the same Manufacturer. The actuators and valves shall be furnished and installed by the valve supplier as a unit assembly, complete in all respects. The actuators and gates shall be furnished and installed by the gate supplier as a unit assembly, complete in all respects.

1.2 REFERENCES

A. Section 40 05 52 Process Valves

B. AWWA C513 and C561

1.3 CONTRACTOR SUBMITTALS

A. General: Submittals shall be furnished in accordance with Section 01 33 00 – Contractor Submittals.

B. Shop Drawings: Shop Drawings of all actuators shall be submitted together with the valve and gate submittals as a complete package.

1.4 QUALITY ASSURANCE

A. Qualifications

1. Technologies and devices used in the actuator must have a minimum of five (5) years of commercial operating experience for that specific manufacturer.

B. Testing

1. Electric actuators shall be listed by a testing agency acceptable to the Owner in accordance with the latest version of the National Electrical Code, with the stamped or mark of that agency on the outside housing. Acceptable agencies include but are not limited to, UL, FM, and CSA.

PART 2 PRODUCTS

2.1 GENERAL

A. General: Unless otherwise indicated, all shut-off and throttling valves, and externally-actuated valves and gates, shall be provided with manual or power actuators. The Contractor shall furnish all actuators complete and operable with mounting hardware, motors, gears, controls, wiring, solenoids, handwheels, levers, chains, and extensions, as applicable. All actuators shall be capable of holding the valve in any intermediate position between fully open and fully closed without creeping or fluttering. All wires of motor-driven actuators shall be identified by unique numbers.

B. Manufacturers: Where indicated, certain valves and gates may be provided with actuators manufactured by the valve or gate Manufacturer. Where actuators are furnished by different manufacturers, the Contractor shall coordinate selection to have the fewest number of manufacturers possible.

C. Materials: All actuators shall be current models of the best commercial quality materials and liberally sized for the maximum expected torque. All materials shall be suitable for the environment in which the valve or gate is to be installed.

D. Mounting: All actuators shall be securely mounted by means of brackets or hardware specially designed and sized for this purpose and of ample strength. The word "open" shall be cast on each valve or actuator with an arrow indicating the direction to open in the counter-clockwise direction. All gear and power actuators shall be equipped with position indicators.

E. Standard: Unless otherwise indicated and where applicable, all actuators shall be in accordance with ANSI/AWWA C 540 - Standard for Power-Actuating Devices for Valves and Sluice Gates.

F. Functionality: Electric, pneumatic, and hydraulic actuators shall be coordinated with power and instrumentation equipment indicated elsewhere in the Contract Documents.

2.2 MANUAL ACTUATORS

A. General: Unless otherwise indicated, all valves and gates shall be furnished with manual actuators. Valves in sizes up to and including 4 inches shall have direct acting lever or handwheel actuators of the Manufacturer's best standard design. Larger valves and gates shall have gear-assisted manual actuators, with a maximum operating pull of 60 pounds on the rim of the handwheel. All buried and submerged gear-assisted valves, all gates, all gear-assisted valves for pressures higher than 250 psi, all valves 30 inches in diameter and larger, and where so indicated, shall have worm-gear actuators, hermetically sealed and grease packed, where buried or submerged. All other valves 6 inches to 24 inches in diameter may have traveling-nut actuators, worm-gear actuators, spur- or bevel-gear actuators, as appropriate for each valve.

Manually operated lifts shall be of the hand wheel type or single speed, removable crank type as shown in the Gate Schedule, conforming to applicable provisions of AWWA Standard C560 or C561 as amended herein. The handwheel or crank will be mounted atop the self-contained gate frame. After the gate has been "cracked" from its wedging devices, a maximum hand pull of 25 pounds shall be required to open the gate under the specified operating heads.

Provide hand wheel lift units with cast iron cap, hand wheel and a cast bronze lift nut. The lift nut shall be flanged and shall have ball thrust bearings above and below it to take the thrust developed during opening and closing of the gate. Adequate grease fittings shall be provided to lubricate the bearings and other moving parts. The rim of the hand wheel shall be cast smooth and be free of sharp edges. An arrow shall be cast in the rim of the hand wheel with the word "open" to indicate direction of rotation to open the gate.

Hand cranks shall have a maximum 15-inch operating radius and shall be provided with a revolving sleeve. All gears, sprockets and pinions shall be of steel and have cut teeth. Sufficient grease fittings shall be provided to allow lubrication of all moving parts, such as bearings, gears, etc. Ball thrust bearings shall be provided above and below the flange on the lift nut to take the normal thrust developed during opening and closing of the gate under the maximum specified operating heads. All other bearings shall be provided with bronze sleeves. An arrow shall be cast in the lift housing to indicate the direction of opening. It shall be readily visible to the operator. Lift nuts shall be of cast bronze.

All lifts shall be equipped with a transparent rigid polycarbonate stem cover with permanent marking to indicate full open, full closed, and gate level in 1-inch graduations. Lift nut shall be threaded with left hand threads for standardized valve operation.

B. Buried Valves: Unless otherwise indicated, all buried valves shall have stainless steel extension stems to grade, with square nuts or floor stands, position indicators, and cast iron or steel pipe extensions with valve boxes, covers, and operating keys. Where so indicated, buried valves shall be in cast iron, concrete, or similar valve boxes with covers of ample size to allow operation of the valve actuators. Covers of valve boxes shall be permanently labeled as requested by the local Owner or the Engineer. The Contractor shall furnish a minimum of two (2) operating keys, or one key per ten (10) valves, whichever is greater, for each wrench-nut.

C. Chain Actuator: Manually-actuated valves with the stem located more than 6 feet above the floor or operating level shall be furnished with chain drives consisting of sprocket-rim chain wheels, chain guides, and operating chains, and be provided by the valve Manufacturer. The wheel and guide shall be of ductile-iron, cast-iron, or steel, and the chain shall be hot-dip galvanized steel or stainless steel, extending to 4 feet above the operating floor level. The valve stem of chain-actuated valves shall be extra strong to allow for the extra weight and chain pull. Hooks shall be provided for chain storage where chains interfere with pedestrian traffic.

D. Floor Boxes: Hot-dip galvanized cast iron or steel floor boxes and covers to fit the slab thickness shall be provided for all operating nuts in or below concrete slabs. For operating nuts in the concrete slab, the cover shall be bronze-bushed.

E. Manual Worm-Gear Actuator: The actuator shall consist of a single or double reduction gear unit contained in a weather-proof cast-iron or steel body with cover and minimum 12-inch diameter handwheel. The actuator shall be capable of 90-degree rotation and shall be equipped with travel stops capable of limiting the valve opening and closing. The actuator shall consist of spur or helical gears and worm-gearing. The spur or helical gears shall be of hardened alloy steel and the worm-gear shall be bronze alloy. The worm-gear shaft and the handwheel shaft shall be of 17-4 PH or similar stainless steel. All gearing shall be accurately cut with hobbing machines. Ball or roller bearings shall be used throughout. Actuator output gear changes shall be mechanically possible by simply changing the exposed or helical gearset ratio without further disassembly of the actuator. All gearing shall be designed for a 100 percent overload.

2.3 ELECTRIC MOTOR ACTUATORS

A. General

1. Where noted, electric actuators for all valves and gates shall be non-intrusive, intelligent multi-turn type, suitable for use on a nominal 480 VAC, three phase, 60 Hertz power supply and are to incorporate motor, integral reversing starter, local control facilities, and terminals for remote control and indication connections within a self-contained, sealed enclosure.

2. All other electric motor actuators shall be non-intrusive, intelligent quarter-turn type, suitable for use on a nominal 480 VAC, three phase, 60 Hertz power supply and are to incorporate motor, integral reversing starter, local control facilities, and terminals for remote control and indication connections within a self-contained, sealed enclosure.

3. The actuator shall include a device to ensure that the motor runs with the correct rotation for the required direction of valve travel with either phase sequence of the three-phase power supply connected to the actuator.

4. It shall be possible to carry out the setting of the torque, turns, and configuration of the indication contacts without opening or removing any electrical compartment covers.

5. Diagnostic information shall be available from both an integrally-mounted display window and through non-intrusive means of reading and writing data to the actuator.

6. Two-way communication shall be possible to facilitate downloading actuator setup.

7. During loss of electric power supply, fail in last valve position.

8. Operate from Fully-Closed to Fully-Open position or the reverse so that stem travel speed is 1 foot per minute.

9. Operator shall be equipped with auxiliary hand operator (side handwheel), stem cover, and shall be installed on a floor mounted operating pedestal. Each operator shall be designed with ample strength and power to operate the sluice gate under maximum heads as shown in the gate schedule, at a minimum speed of 1-foot per minute, without overloading the motor and shall be for indoor service.

10. Provide integral electric controls for open-close or modulating service as indicated on the valve schedule, including reversing starter, limit switches, torque switch, indicating lights and local-off-remote switch. Comply with AWWA C540. The motor shall be totally enclosed and nonventilated with all leads terminating within the limit switch compartment.

11. Units shall be equipped with hammer blow device to assist in opening the gate and permit motor to reach full speed before delivering torque.

12. Provide auxiliary contacts for remote monitoring of position and "ready" indication. Ready indication shall be indicated when the valve selector is in the "remote" position. At a minimum, contacts shall be provided for remote confirmation of the fully open and fully closed positions.

B. Actuator Sizing

1. The actuator shall be sized to guarantee valve or gate closure at the specified differential pressure. The safety margin of motor power available for seating and unseating the valve shall be sufficient to ensure torque switch trip at maximum valve torque with the supply voltage 10% below nominal.

C. Temperature

1. The actuator shall be capable of functioning in an ambient temperature ranging from minus 13 F (-25° C) to plus 160° F (+ 70° C).

D. Torque Controller

1. The motor control circuit board shall monitor and control the amount of torque output produced by the motor. Motor current shall be measured via a sensing resistor mounted on the motor control circuit board, which is digitally filtered and then temperature compensated to produce the final calibrated output torque of the actuator. Torque setting shall be able to be set between 40% and 100% of rated torque, in 1% increments, and shall be adjustable via a non-intrusive setting tool using Infrared Data Access (IrDA) technology.

E. Motor

1. Motors shall be sized for a minimum 25 percent duty and a rated running torque equal to 35 percent of the operator capacity at a rated running time of 15 minutes, without exceeding the allowable NEMA temperature rise for class F insulation.

2. Motors shall be totally-enclosed, reversible, non-ventilated, direct current motor.

3. The electric motor shall be a low inertia motor. The motor shall be controlled by a toroidal transformer unit, which shall also include a thermostat for motor circuit protection. Motors shall be specifically designed and built by the actuator manufacturer for electric actuator service.

4. If three-phase-powered actuators are provided, the actuator shall include automatic detection and correction of 3-phase power supply to assure proper open/close directions.

5. The motor control circuit board shall restrict the amount of current to prevent damage to the motor, integral switching devices or toroid

transformer. A 20A fuse in the transformer secondary circuit and anti-surge fuse in the primary circuit shall provide further protection.

6. Motor removal shall be possible without loss of lubricant.

F. Gearing and Gearbox

1. The actuator gearing shall be totally enclosed in a lubricant filled gearcase suitable for operation at any angle. Food grade lubricants approved by the manufacturer shall be used to lubricate the gearcase. Special or exotic lubricants shall not be used.

2. Gearbox shall house and operate an appropriate coupling as follows:

a. Coupling of operator to a multi-turn threaded rising stem valve shall be by means of threaded high tensile bronze top entry stem nut installed in a declutchable thrust base. Stem nut shall be keyed to mate with the internal bore and keyway of the operator sleeve.

b. Coupling of operator to a multi-turn non-rising stem shaft shall be by a high-tensile aluminum/bonze drive bushing that is easily replaceable.

3. Final stage of the operator gear train shall consist of a steel worm and a bronze alloy worm gear. Other gears shall be heated treated alloy steel or high tensile bronze. Gear train shall be supported throughout by antifriction ball or roller bearings. The operator shall be self-locking in either motor or handwheel mode.

G. Hand Operation

1. A handwheel shall be provided for emergency operation engaged when the motor is declutched by a lever or similar means; the drive being restored to power automatically by starting the motor. The handwheel declutch mechanism shall include an output contact to indicate actuator manual operation. The hand/auto selection lever should be padlockable in both "Hand" and "Auto" positions. It should be possible to select hand operation while the actuator is running or start the actuator motor while the hand/auto selection lever is locked in "Hand" without damage to the drive train.

2. Handwheel shall be disengaged by motor operation.

3. Actuator shall incorporate a mechanism to track valve position while operated with the handwheel when electric power is off.

H. Position Setting Range

1. An intelligent micro controller on the motor control circuit board shall monitor and control two Hall Effect position sensors. Incremental encoders requiring batteries to retain settings upon loss of power shall not be accepted. The sensors shall employ a magnetic pulse system to measure the accuracy of the actuator's stroke. Position limits shall be factory set to 90° degrees stop bolt position, with a limit setting range of 10° to 1800°, and maximum angular resolution to 0.1°.

I. Controls

1. Control power shall be provided from an integral 24 VDC or 120 VAC supply unless a separate power source is shown on the electrical drawings. The transformer shall be sized to operate at not more than 80 percent of rating with the connected load shown. The transformer shall have protective secondary fusing. Operators shall be provided with an integral control station. The control station shall include "LOCAL/OFF/REMOTE" and "OPEN/STOP/CLOSE" switches. Open and Close positions shall be configurable for momentary or maintained operation. Open, Close, and Stop.

J. Enclosure

1. Double-sealed 'O' Ring design shall provide a termination chamber that is separate and sealed from the control chamber. Control components shall remain sealed and protected when the termination cover is removed. Actuators shall be sealed, watertight to NEMA 6, and shall at the same time have an inner watertight and dustproof 'O' ring seal between the terminal compartment and the internal electrical elements of the actuator fully protecting the motor and all other internal electrical elements of the actuator from ingress of moisture and dust when the terminal cover is removed on site for cabling.

2. Enclosure must allow for temporary site storage without the need for electrical supply connection.

3. All external fasteners shall be stainless steel.

    a. Actuators for explosion/hazardous applications shall in addition be certified flameproof for Zones 1 and 2 (Divisions 1 and 2) Group C, D, E, F, G hazardous areas.

b. Double-sealed design shall provide a termination chamber that is separate and sealed from the control chamber. Control components shall remain sealed and protected when the termination cover is removed.

K. Local Position Indication

1. The actuator must provide a local display of the position of the valve, even when the power supply is not present. The display shall be able to be rotated in 90-degree increments in order to provide easy viewing regardless of actuator mounting position.

2. The local display should be large enough to be readable from a distance of six feet (6') when the actuator is powered up. In addition to valve position, the local display shall also display torque in percent of rated value as well as customer-configurable multilingual text.

3. The actuator shall include a digital position indicator with a display from fully open to fully closed in 1% increments. Red, green, and yellow lights corresponding to Open, Closed, and Intermediate positions shall be included on the actuator. The digital display shall be maintained even when the power to the actuator is isolated.

L. Integral Push Button and Selector

1. Integral to the actuator shall be local controls for Open, Close, and Stop, and a local/remote selector switch padlockable in any one of the following three positions:

   a. Local Control Only
   b. Off (No Electrical Operation)
   c. Remote Control plus Local Stop Only.

2. It shall be possible to select maintained or non-maintained local control.

3. The local controls shall be arranged so that the direction of valve travel can be reversed without the necessity of stopping the actuator. It shall be possible to program the actuator without removal of any covers.

M. Performance Test Certificate

1. Each actuator must be performance tested and individual test certificates shall be supplied free-of-charge. The test equipment should simulate a typical valve load and the following parameters should be recorded:

a. Current at maximum torque setting
b. Torque sensing tripping points in both the open and closed directions of travel
c. Actuator Output Speed or Operating Time

2. In addition, the test certificate should record details of specification, such as gear ratios for both manual and automatic drive, closing direction, and wiring diagram code number.

N. Warranty

1. Each actuator shall be warranted for a minimum of 12 months of operation up to a maximum of 24 months from shipment. This warranty shall be held in effect regardless of pre-commissioning conditions in a typical indoor or outdoor environment as long as the actuator is not abused or disassembled. This warranty shall not require the use of special storage procedures (such as the use of indoor storage, plastic bags, desiccants, and the energization of heater(s) in order to be maintained.

O. Manufacturers

1. Limitorque Accutronix MX 40 Series-Basis of Design

2. Rotork IQTM Mk. 3 Series
3. AUMA
4. Approved Equal

PART 3 EXECUTION

3.1 SERVICES OF MANUFACTURER

A. Field Adjustments

1. Field representatives of manufacturers of valves or gates with pneumatic, hydraulic, or electric actuators shall adjust actuator controls and limit-switches in the field for the required function.

a. Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for not less than one (1) eight-hour day on site for installation, inspection, startup, training, and field testing.

3.2 INSTALLATION

A. It shall be the responsibility of the Contractor to handle, store and install the equipment specified in this Section in strict accordance with the manufacturer's recommendations.

B. The Contractor shall review the installation drawings and installation instruction prior to installing the actuators.

3.3 FIELD TESTING

A. After installation, all actuators shall be field tested in the presence of the Engineer and Owner to ensure that all items of equipment are in full compliance with this Section. A startup certificate shall be generated and provided to the Owner from the authorized electric actuator representative following system commissioning.

B. Each actuator shall be cycled to confirm that they operate without binding, scraping, or distorting. The effort to open and close manual operators shall be measured and shall not exceed the maximum operating effort specified above. Electric motor actuators shall function smoothly and without interruption

END OF SECTION

Construction Drawings

NEW FLOOR STAND MOUNTING

SITE MAP:

FOR REPRE

Consultant: consor

Final Submittal

Engineer's Seal: ANDREW W. HOWE, REGISTERED ENGINEER, AGRICULTURAL, No. 112400, STATE OF TENNESSEE, 12/5/2025

Client / Owner: CITY OF ALCOA

Project Title: CITY OF ALCOA RAW WATER INTAKE IMPROVEMENTS

SITE PLAN

Designed By: MG	Consor Project No.: D231747TN.03
Drawn By:	Issued On: NOVEMBER, 2025
Checked By: MH	Sheet: C.01
Approved By: AH	NOT TO SCALE

CONSTRUCTION NOTES.

1. CAREFULLY REMOVE EXISTING EQUIPMENT. PREVENT DAMAGE TO EXISTING CONCRETE SURFACES.
2. REPAIR CONCRETE BY PATCHING SURFACES WITH NON-SHRINK GROUT AND APPLYNG BONDING AGENT BETWEEN EXISTING AND NEW CONCRETE.
3. CUT ANY BOLTS/ANCHORS TO REMAIN IN THE CONCRETE WALL FLUSH WITH THE WALL SURFACE. GRIND TO A SMOOTH FINISH WHERE NECESSARY.
4. CONTRACTOR TO PROVIDE PIPE BRACING AND TEMPORARY 20" BLIND FLANGE AND GASKET TO BE USED AT THE LOCATION OF THE BUTTERFLY VALVE REMOVAL TO ENABLE RETURNING PUMPING SYSTEM INTO SERVICE FOLLOWING THE BFV REMOVAL.

REMOVE EXISTING BUTTERFLY VALVE (FL) AND FLANGED SPOOL PIECE ABOVE IT. PROVIDE TEMPORARY SUPPORT TO ELECTRIC CHECK VALVE ABOVE AND VERTICAL 20" DIP BELOW. REPLACE WITH A NEW BUTTERFLY VALVE.

REMOVE AND REPLACE EXISTING MANUAL VALVE ACTUATOR.

REMOVE AND REPLACE EXISTING FLOOR STAND, HANDWHEEL, AND EXTENSION STEM.

REMOVE EXISTING GATE FLOOR STAND, ACTUATOR AND HAND CRANK LEVER. REPLACE WITH NEW ELECTRIC ACTUATOR AS SHOWN ON SHEET XX.

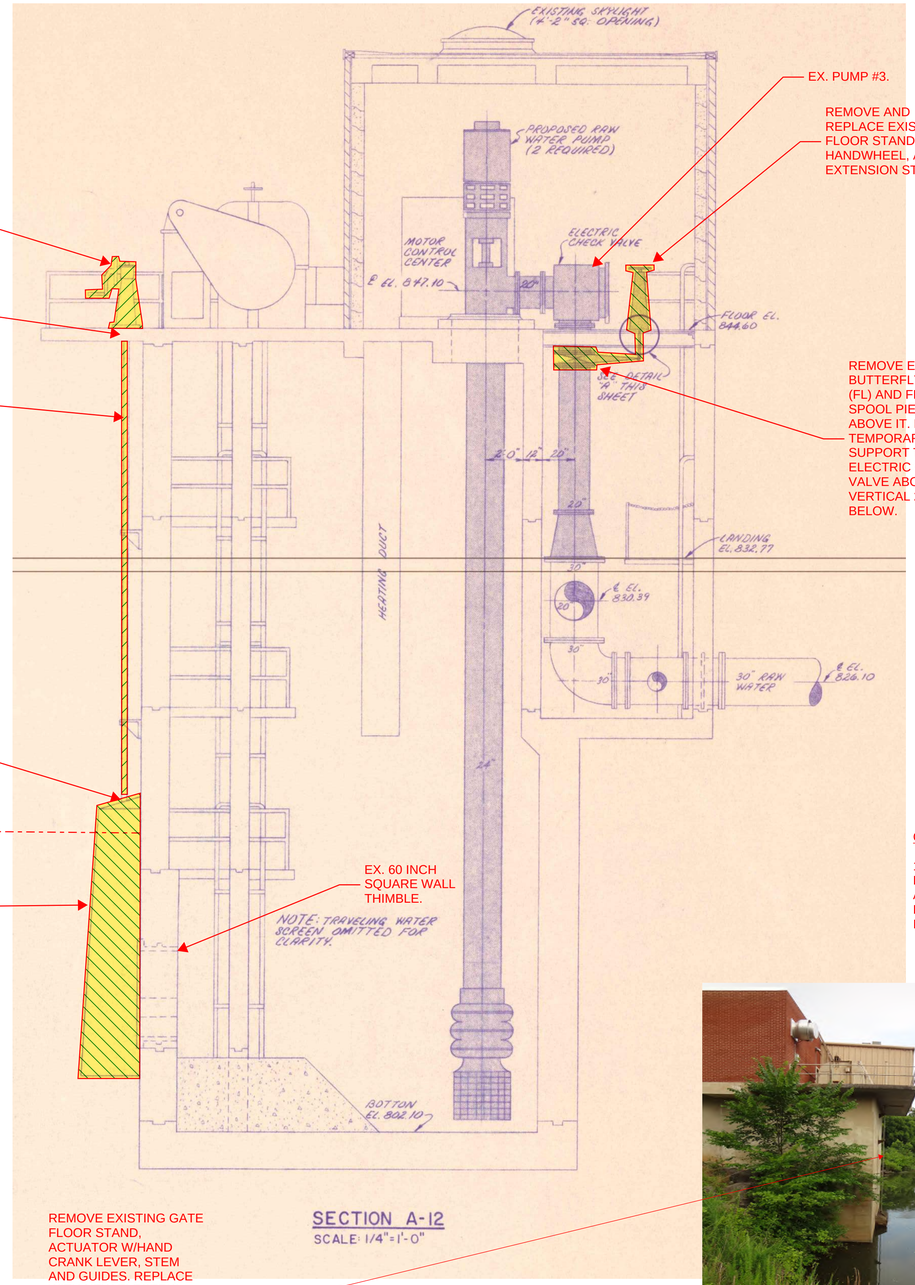
EXISTING FLOOR OPENING TO BE SALVAGED AND REUSED.

REMOVE AND REPLACE EXISTING EXTENSION STEM AND WALL GUIDES.

DISCONNECT EXTENSION STEM FROM EXISTING SQUARE NUT OPERATOR.

WATER ELEVATION. TYP.

REMOVE EXISTING COARSE BAR SCREEN. REPLACE WITH NEW SCREEN AS SHOWN ON SHEET XXX.



GENERAL NOTES.

1. ALL DRAWINGS PROVIDED BY CITY OF ALCOA. RECORD DRAWINGS FROM ORIGINAL INTAKE.

Consultant: consor

Final Submittal

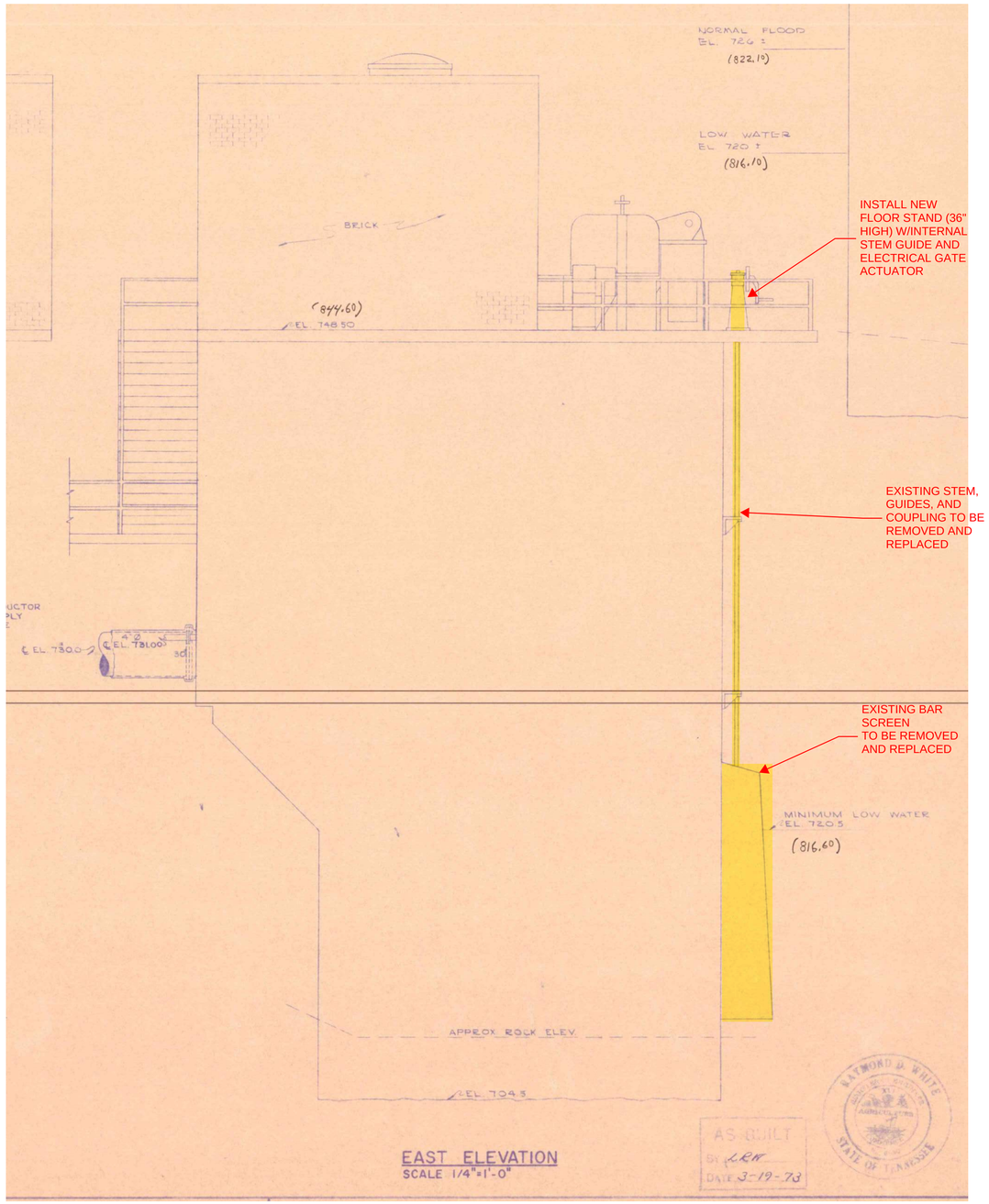
Engineer's Seal: ANDREW W. HOME, REGISTERED ENGINEER, AGRICULTURE, COMMERCE, No. 112486, STATE OF TENNESSEE, 12/5/2025

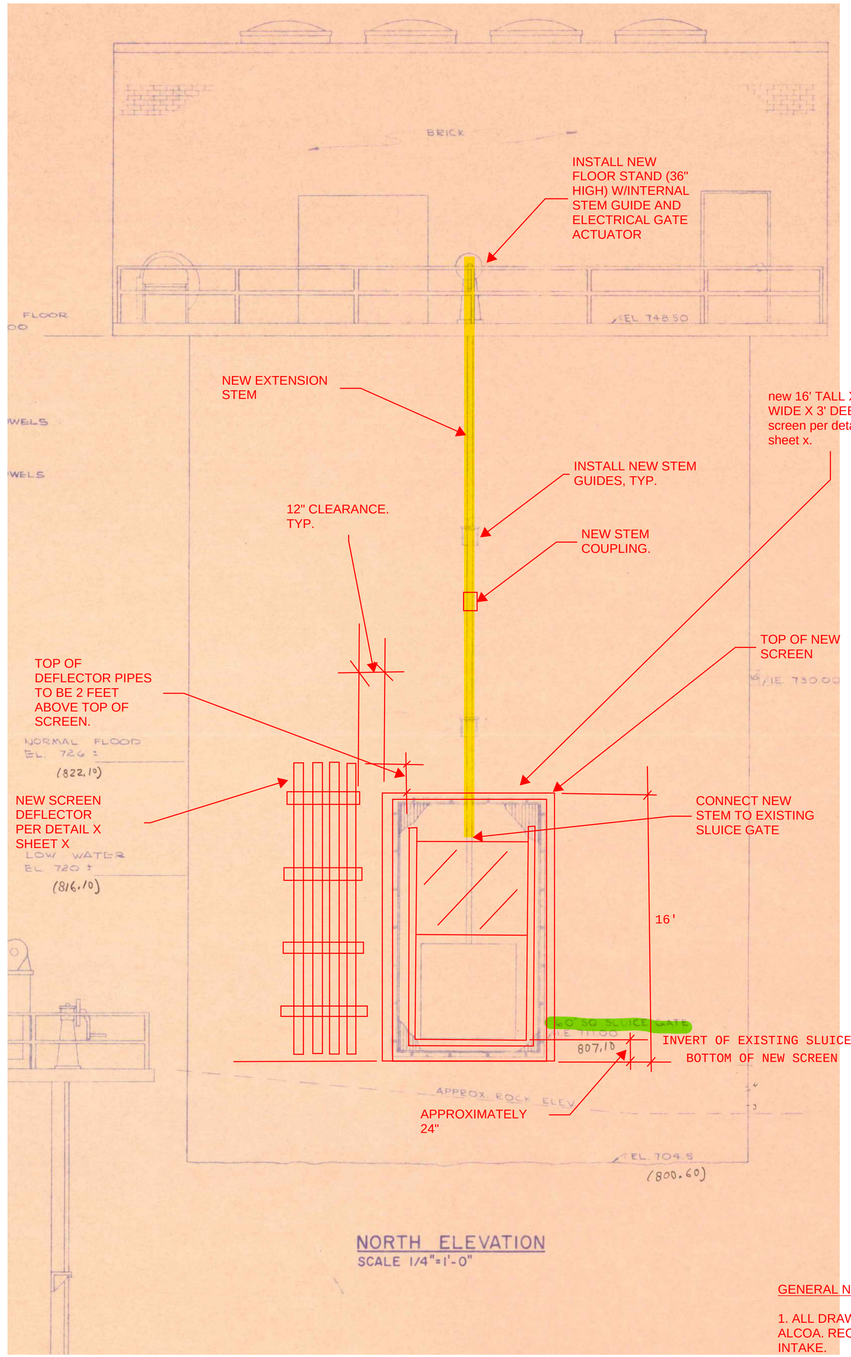
Client / Owner: CITY OF ALCOA

Project Title: CITY OF ALCOA RAW WATER INTAKE PS IMPROVEMENTS

DEMOLITION

Designed By: MG	Consor Project No.: D231747TN.03
Drawn By:	Issued On: NOVEMEBR, 2025
Checked By: MH	Sheet: D.01
Approved By: AH	NOT TO SCALE





GENERAL NOTES.

1. ALL DRAWINGS PROVIDED BY CITY OF ALCOA. RECORD DRAWINGS FROM ORIGINAL INTAKE.

Consultant:

consor

Final Submittal

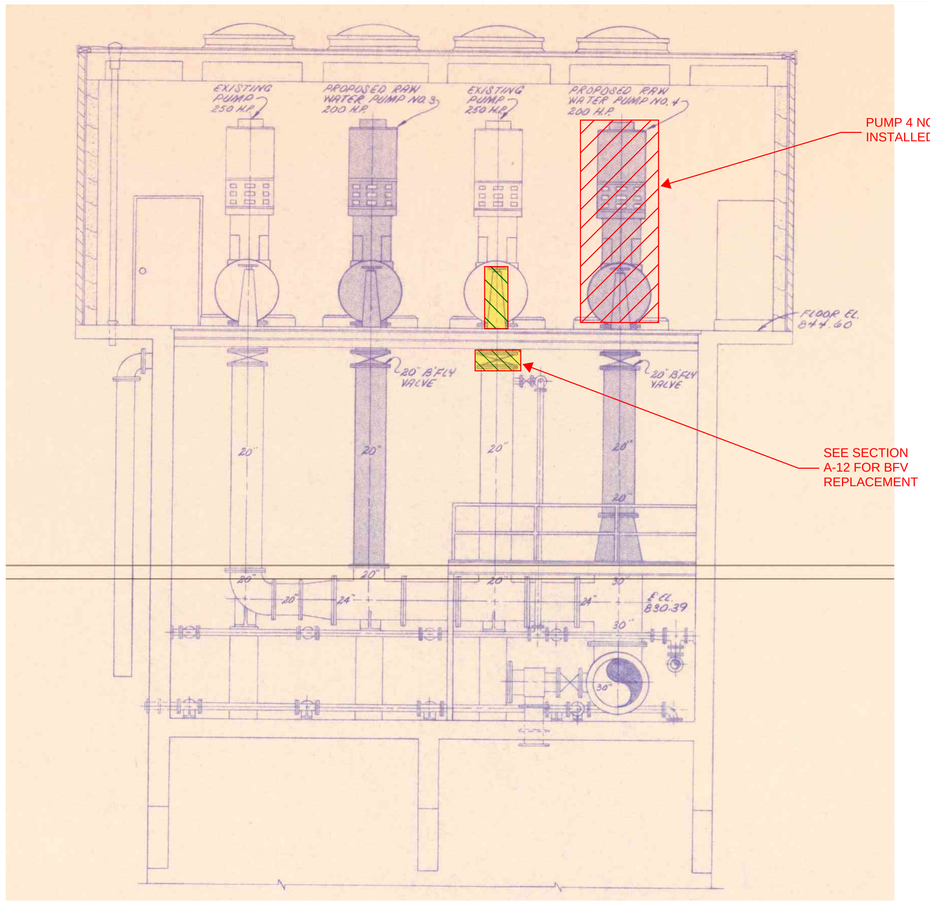
Engineer's Seal: ANDREW W. HOWE, REGISTERED ENGINEER, No. 112180, STATE OF TENNESSEE, 12/5/2025

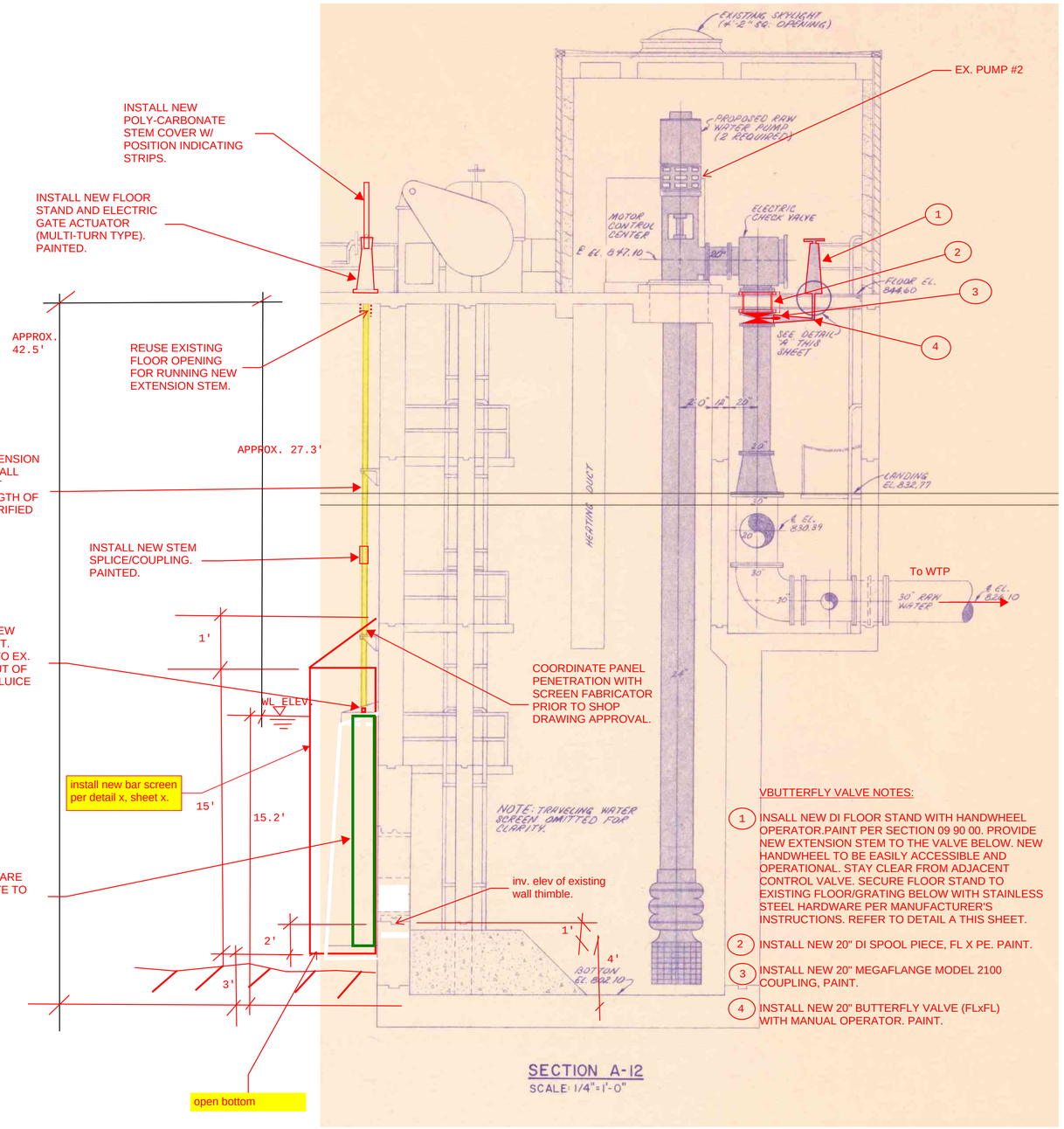
Client / Owner: CITY OF ALCOA

Project Title: CITY OF ALCOA RAW WATER INTAKE IMPROVEMENTS

SCREEN IMPROVEMENTS ELEVATIONS

Designed By: MG	Consor Project No.: D231747TN.03
Drawn By:	Issued On: AUGUST, 2025
Checked By: MH	Sheet: M.01
Approved By: AH	NOT TO SCALE





CONSTRUCTION NOTES:

1. ALL NEW BOLTS AND HARDWARE IN EXPOSED AREAS OF THE PUMP STATION SHALL BE 316 STAINLESS STEEL, OR OTHERWISE SPECIFIED IN THE TECHNICAL SPECS. ALL ANCHOR BOLTS AND HARDWARE FOR THE STEM GUIDES AND COARSE BAR SCREEN MOUNTING SHALL BE 316 SST.

2. NEW GASKET MATERIAL for DI PIPE SHALL BE PER TECHNICAL SPECS.

3. APPLY A COAT OF BITUMASTIC COATING WHERE METAL COMPONENTS MOUNT TO CONCRETE SURFACES.

4. PAINTING OF THE NEW VALVE, ACTUATORS, FLOOR STANDS AND HANDWHEEL OPERATOR SHALL BE COATING SYSTEM 101 PER SECTION 09 90 00.

5. PAINTING OF THE NEW DI PIPING AND ACCESSORIES SHALL BE COATING SYSTEM 101. ALL DI PIPING SHALL HAVE CEMENT LINED COATING ON THE INTERIOR.

6. PROVIDE TEMPORARY BYPASS PUMPING IF BUTTERFLY VALVE REPLACEMENT WILL LAST MORE THAN 6 HOURS OR OTHERWISE APPROVED BY PLANT OPERATOR.

7. SCREEN REMOVAL AND REPLACEMENT SHALL TAKE PLACE IN SUBMERGED WATER CONDITIONS BY A DIVING TEAM IN COMBINATION WITH SURFACE SUPPORT BY THE CONTRACTOR.DIVING TEAM SHALL BE PART OF THE CONTRACTOR'S SCOPE OF WORK.

8. PROVIDE TEMPORARY BYPASS PUMPING DURING ALL SCHEDULED DOWNTIME.

9. CONTRACTOR SHALL ANTICIPATE AND INCLUDE COST AND RESOURCES TO CLEAR PART OF SOLIDS DEPOSIT AT THE BOTTOM OF THE EXTERIOR SCREEN. THE EXTENT OF SOLIDS REMOVAL SHALL BE AS IDENTIFIED BY THE DIVING TEAM DURING THE XX FIELD VISIT. ANY ADDITIONAL WORK BEYOND THOSE LIMITS SHALL BE COVERED AND PAID VIA AN ALLOWANCE.

10. ALL DIMENSIONS NOTED/SHOWN ON THE PLANS ARE APPROXIMATE. CONCTRACTOR SHALL FIELD VERIFY ALL CRITICAL DIMENSIONS PRIOR TO SHOP DRAWING SUBMITTALS. NOTIFY ENGINEER/OWNER WHERE DEVIATIONS MAY ARISE.

11. CONTRACTOR TO PROVIDE NON-SHRINK GROUT (1" TO 2" HIGH) UNDER NEW FLOOR STAND, ALONG WITH FOUR ADHESIVE ANCHORS.PROVIDE CORED HOLES TO MATCH DIAMETER AND LENGHT BY
FLOOR STAND SUPPLIER. CONTRACTOR SHALL ALSO PROVIDE ADHESIVE ANCHORS AND PROVIDE CORED HOLES FOR STEM GUIDES MOUNTING.
IN CASE NEW STEM CANNOT CONNECT TO EXISTING SQUARE NUT OF SLUICE GATE, CONTRACTOR/SUPPLIER SHALL PROVIDE
NECESSARY STEM EXTENSION AND FIELD CUT AND DRILLED SERVICES TO CONNECT THE NEW STEM TO THE EXISTING STEM/SLUICE GATE.

VBUTTERFLY VALVE NOTES:

1. INSALL NEW DI FLOOR STAND WITH HANDWHEEL OPERATOR.PAINT PER SECTION 09 90 00. PROVIDE NEW EXTENSION STEM TO THE VALVE BELOW. NEW HANDWHEEL TO BE EASILY ACCESSIBLE AND OPERATIONAL. STAY CLEAR FROM ADJACENT CONTROL VALVE. SECURE FLOOR STAND TO EXISTING FLOOR/GRATING BELOW WITH STAINLESS STEEL HARDWARE PER MANUFACTURER'S INSTRUCTIONS. REFER TO DETAIL A THIS SHEET.
2. INSTALL NEW 20" DI SPOOL PIECE, FL X PE. PAINT.
3. INSTALL NEW 20" MEGAFLANGE MODEL 2100 COUPLING, PAINT.
4. INSTALL NEW 20" BUTTERFLY VALVE (FLxFL) WITH MANUAL OPERATOR. PAINT.

VALVE AND GATE OPERATING CONDITIONS:
EXISTING SLUICE GATE- FULLY OPEN OR CLOSED
NEW BUTTERFLY VALVE- FULLY OPEN OR CLOSED

Consultant: consor

Final Submittal

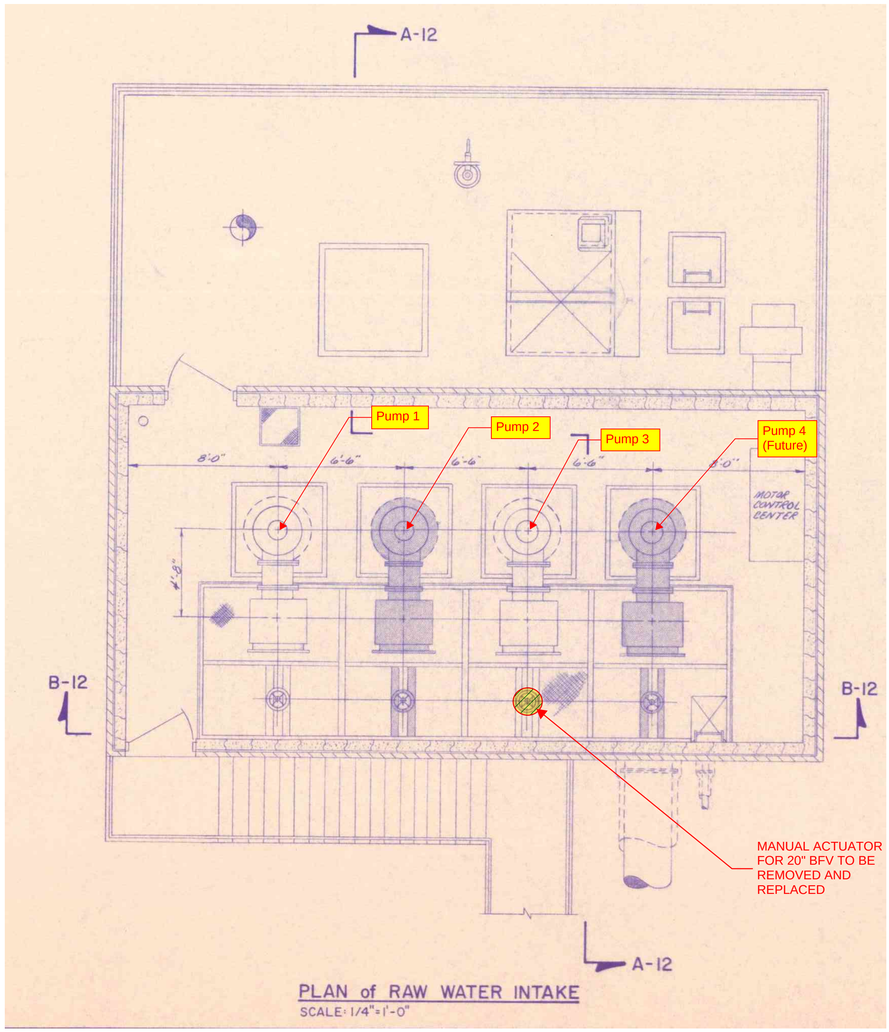
Engineer's Seal: ANDREW W. HOWE, REGISTERED PROFESSIONAL ENGINEER, No. 112486, STATE OF TENNESSEE, 12/5/2025

Client / Owner: CITY OF ALCOA

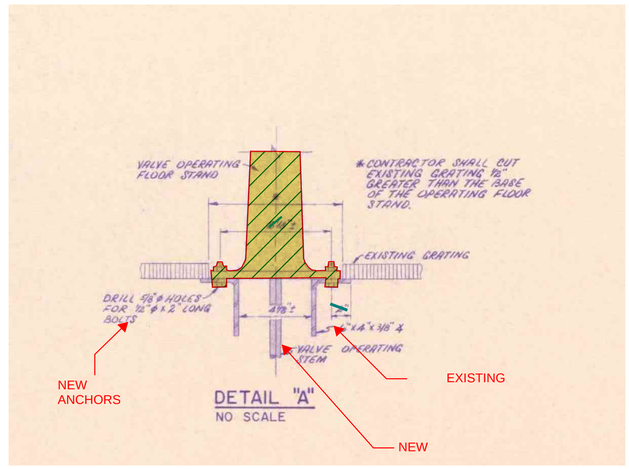
Project Title: CITY OF ALCOA RAW WATER INTAKE IMPROVEMENTS

SCREEN AND VALVE IMPROVEMENTS SECTION AND DETAILS

Designed By: MG	Consor Project No.: D231747TN.03
Drawn By:	Issued On: NOVEMBER, 2025
Checked By: MH	Sheet: M.02
Approved By: AH	NOT TO SCALE



PLAN of RAW WATER INTAKE
SCALE: 1/4"=1'-0"



DETAIL "A"
NO SCALE

NEW FLOOR STAND MOUNTING

Final Submittal

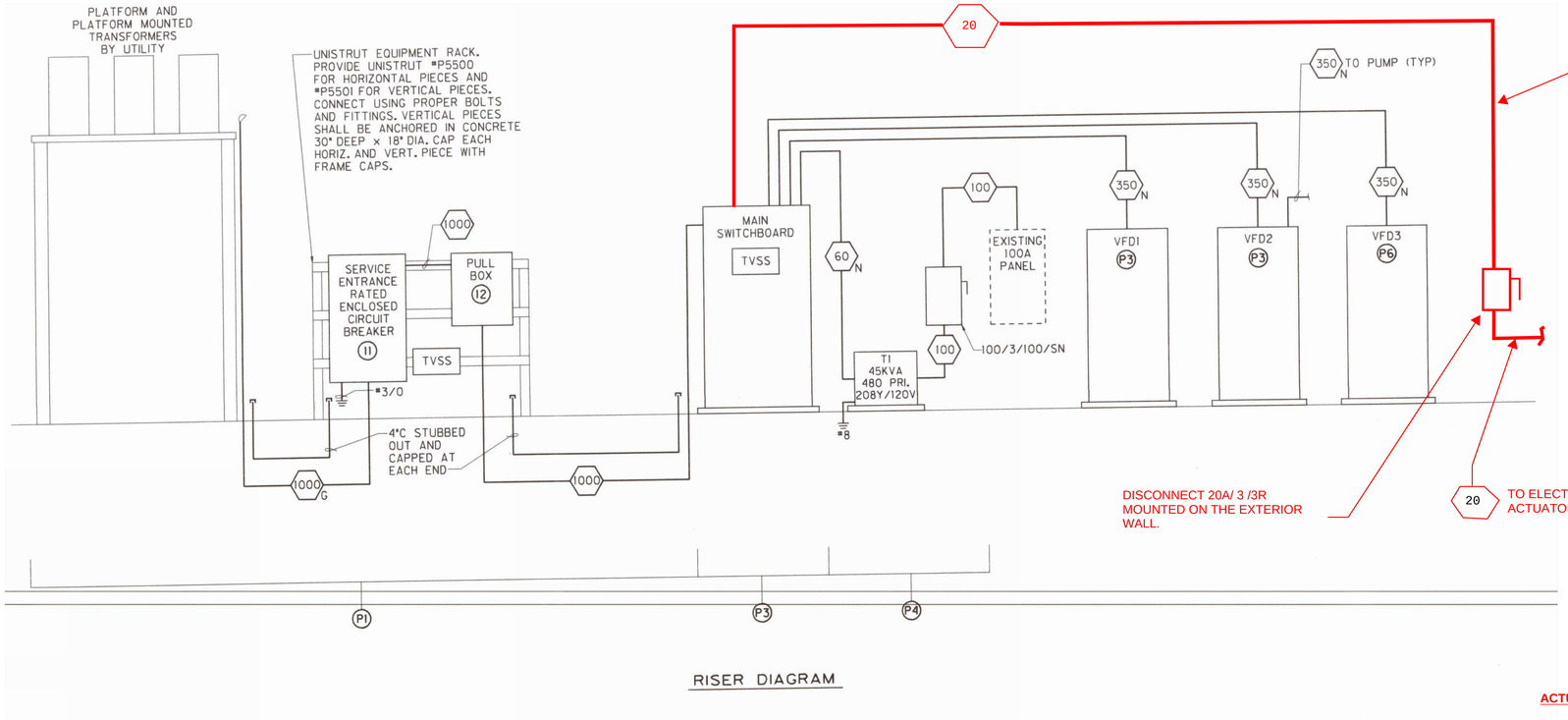
Engineer's Seal:
ANDREW W. HOME
REGISTERED ENGINEER
STATE OF TENNESSEE
12/5/2025
No. 112466

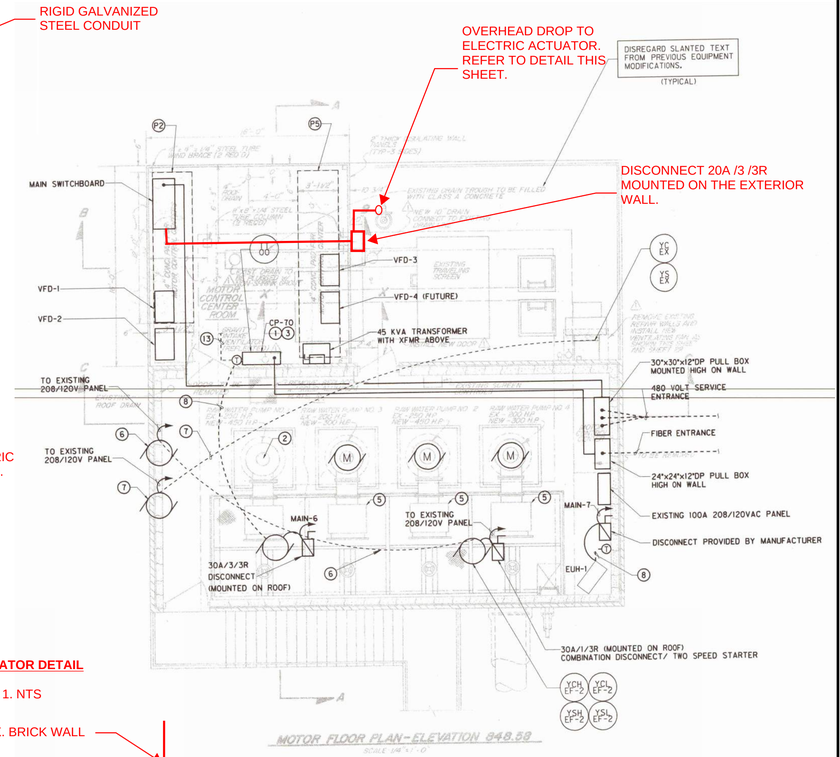
Client / Owner:
CITY OF ALCOA

Project Title:
CITY OF ALCOA RAW WATER INTAKE IMPROVEMENTS

SCREEN AND VALVE IMPROVEMENTS SECTION AND DETAILS

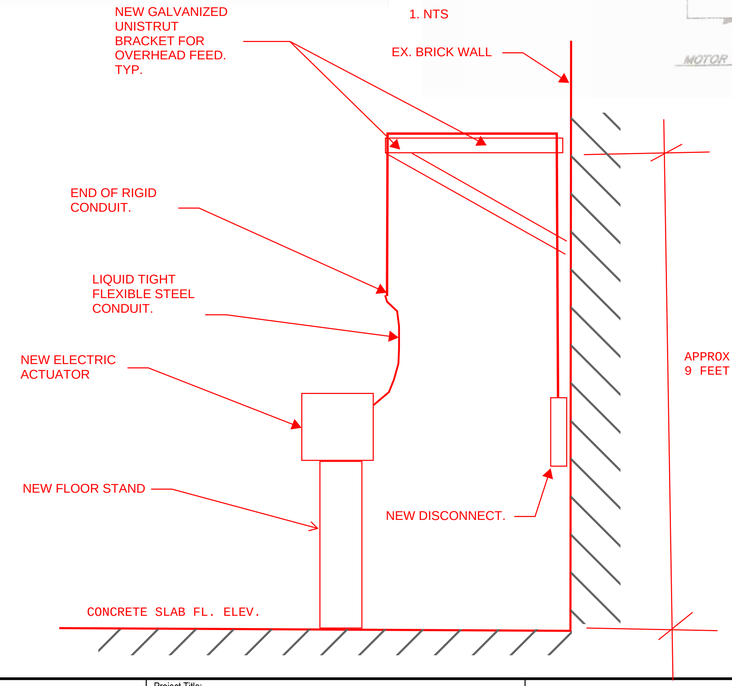
Designed By: MG	Consor Project No.: D231747TN.03
Drawn By:	Issued On: NOVEMBER, 2025
Checked By: MH	Sheet: M.03
Approved By: AH	NOT TO SCALE





ACTUATOR DETAIL

1. NTS



PANEL: MAIN SWBD	DC DEVICE TYPE: Breaker	ENCLOSURE: NEMA 1	MAINS(A): MLO	CONTINUOUS(A): 1200
LOCATION: RW INTAKE	DEVICE FAMILY: Bolt On	MOUNTING: FREE STANDING	WIRING: 3-Phase 4-Wire	AIC RATING(A): 0
FED FROM: ECB		VOLTAGE: 480/ 277		FAULT CURRENT(A) 12416

CUBICLE NO	DESCRIPTION	CONNECTED kVA	DEMAND kVA	DESIGN kVA	DESIGN AVE AMPS	OC DEVICE TYPE	SIZE	P	NOTES
1	VFD 1	186.42	186.42	233.03	280.29		350	3	
2	VFD 2	186.42	186.42	233.03	280.29		350	3	
3	VFD 3	186.42	186.42	233.03	280.29		350	3	
4	VFD 4 (FUTURE)	0.00	0.00	0.00	0.00		350	3	
5	TRANSFORMER	45.00	45.00	56.25	67.66		60	3	
6	A/C-1	13.55	13.55	16.94	20.38		25	3	HACR BREAKER - NOTE 2
7	EUH-1	12.50	12.50	15.63	18.79		20	3	
8	TVSS	0.00	0.00	0.00	0.00		40	3	NOTE 1
9	EL-ACT	3.33	3.33	4.16	5.00		20	3	
10									

ALL CONNECTED	KVA	3P AVE AMPS	* PHASE TOTALS	VA	AMPS	BUS TOTALS	KVA	
TOTAL CONNECTED	630.32	758.2	* A-N	210107.6	758.2	CONNECTED	647.89	DATE: Feb 24, 2005
TOTAL DEMAND	0.00	0.0	* B-N	210107.6	758.2	DEMAND	0.00	TIME: 08:51:35
TOTAL DESIGN	0.00	0.0	* C-N	210107.6	758.2	DESIGN	0.00	

NOTE 1: 4 #8, 1 #10G, IN 3/4"C
NOTE 2: 4 #10, 1 #10G, IN 3/4"C

ELECTRICAL NOTES:

1. CONTRACTOR TO INSTALL A NEW 480V/3 POLE/3 PHASE CIRCUIT BREAKER AND CIRCUIT FROM THE EXISTING DISTRIBUTION PANEL TO SERVE THE NEW ELECTRICAL ACTUATOR FOR THE EXISTING SLUICE GATE.SLUICE GATE SHALL BE OPERATED FROM THE PROPOSED ELECTRIC ACTUATOR CONTROLS AND THE MANUAL HANDWHEEL.
2. NEW ELECTRICAL CONDUIT SHALL BE 1" INCH WITH 4#10, 1#10G
3. REFER TO SECTION 26 05 01 FOR GENERAL ELECTRICAL INSTALLATION AND MATERIAL REQUIREMENTS.

GENERAL NOTES.

1. ALL DRAWINGS PROVIDED BY CITY OF ALCOA. RECORD DRAWINGS FROM ORIGINAL INTAKE.

Consultant: consor

Final Submittal

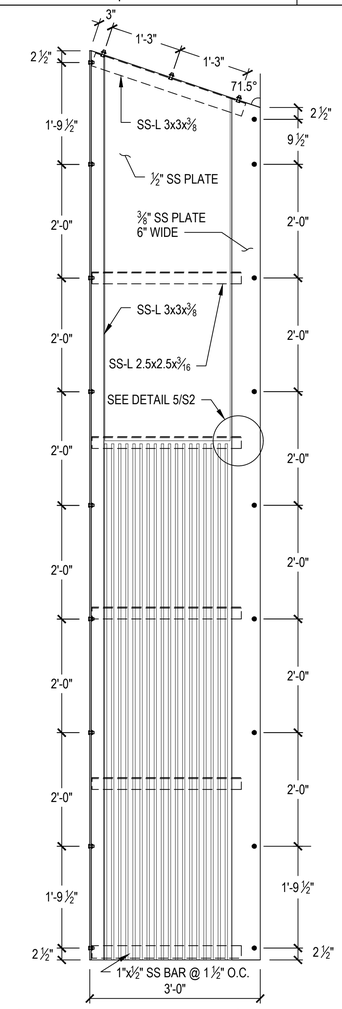
Engineer's Seal: ANDREW W. HOWE REGISTERED ENGINEER 12/5/2025 No. 112400 STATE OF TENNESSEE

Client / Owner: CITY OF ALCOA

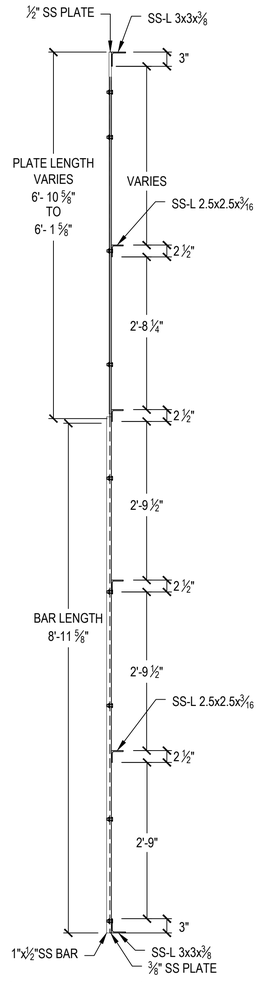
Project Title: CITY OF ALCOA RAW WATER INTAKE IMPROVEMENTS

ELECTRICAL IMPROVEMENTS

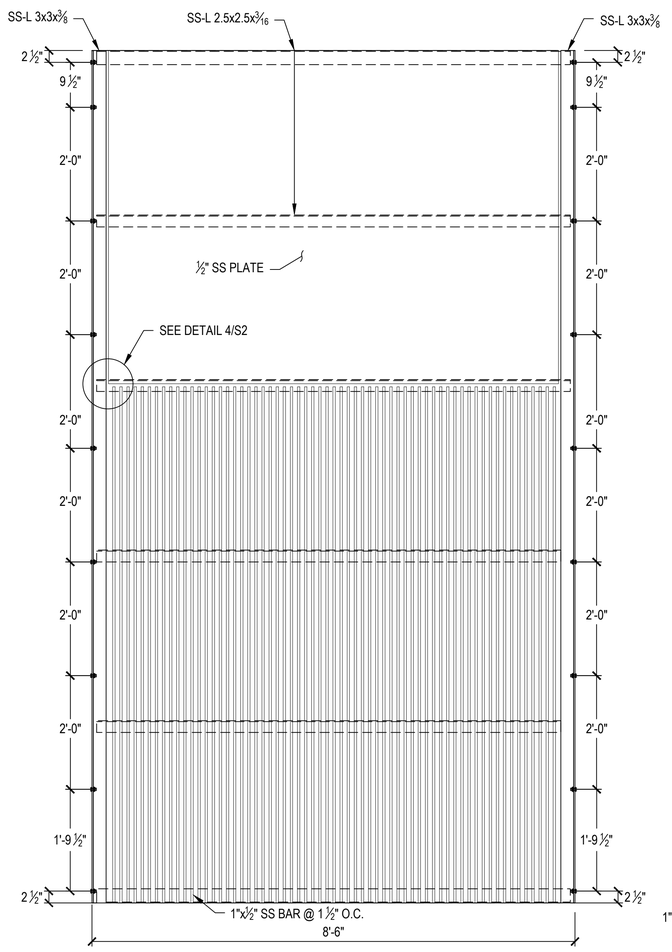
Designed By: MG	Consor Project No.: D231747TN.03
Drawn By:	Issued On: AUGUST, 2025
Checked By: MH	Sheet: E.01
Approved By: AH	NOT TO SCALE



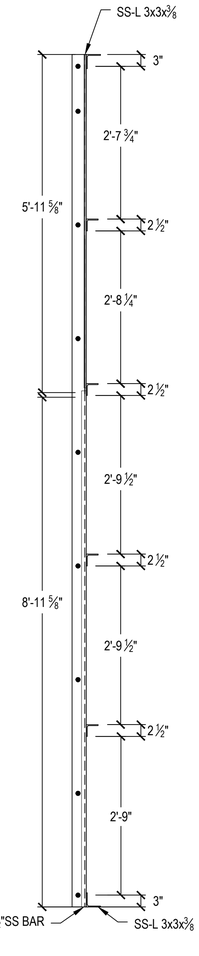
SIDE PANEL ELEVATION VIEW



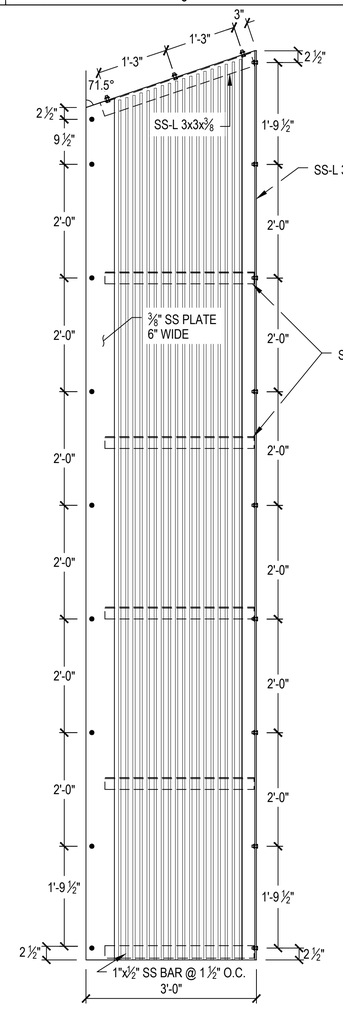
SIDE PANEL SIDE VIEW



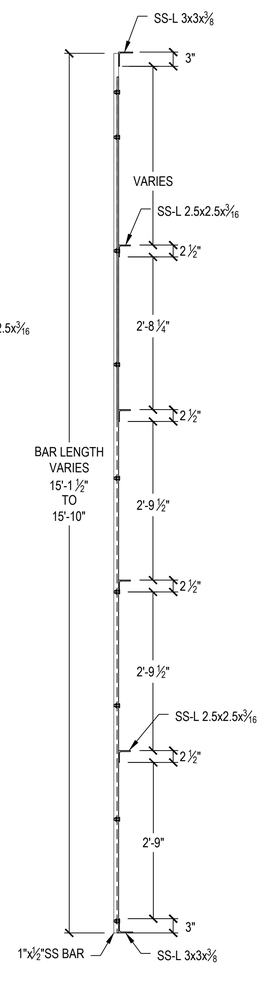
FRONT PANEL ELEVATION VIEW



FRONT PANEL SIDE VIEW



SIDE PANEL ELEVATION VIEW

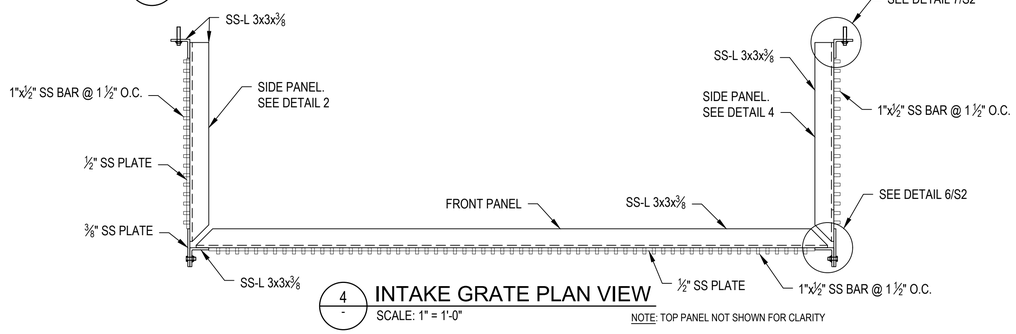


SIDE PANEL SIDE VIEW

1 - INTAKE GRATE SIDE PANEL DETAIL
SCALE: 3/4" = 1'-0"

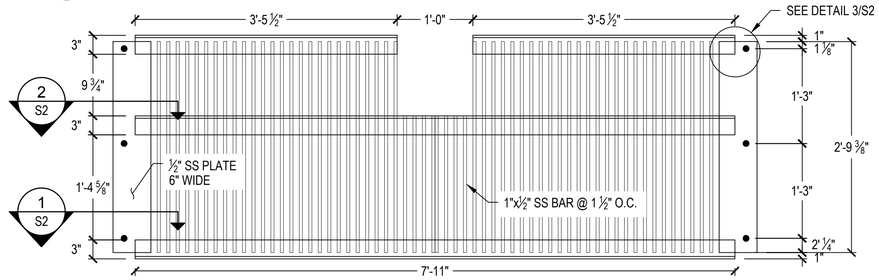
2 - INTAKE GRATE FRONT PANEL DETAIL
SCALE: 3/4" = 1'-0"

3 - INTAKE GRATE SIDE PANEL DETAIL
SCALE: 3/4" = 1'-0"

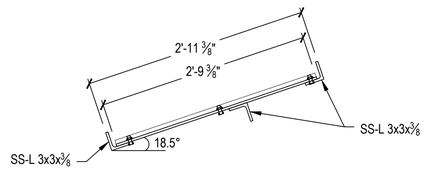


4 - INTAKE GRATE PLAN VIEW
SCALE: 1" = 1'-0"

NOTE: TOP PANEL NOT SHOWN FOR CLARITY



TOP PANEL PLAN VIEW



TOP PANEL SIDE VIEW

5 - INTAKE GRATE TOP PANEL
SCALE: 1" = 1'-0"

Consultant:

consor

Sub Consultant:

FINAL SUBMITTAL

Engineer's Seal:

SERGIO MALDE
REGISTERED ENGINEER
AGRICULTURE
COMMERCE
NO. 131437
STATE OF TENNESSEE

Client / Owner:

Project Title:

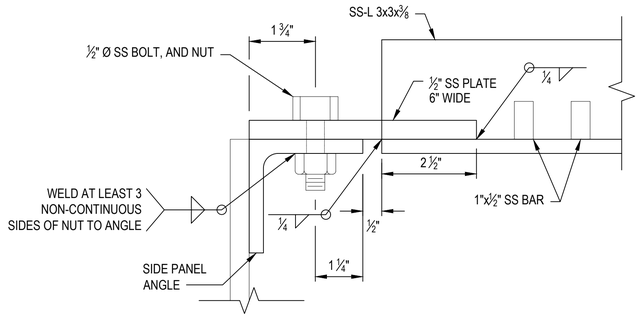
CITY OF ALCOA TN
WTP INTAKE PS IMPROVEMENTS

GENERAL

INTAKE GRATE ELEVATIONS

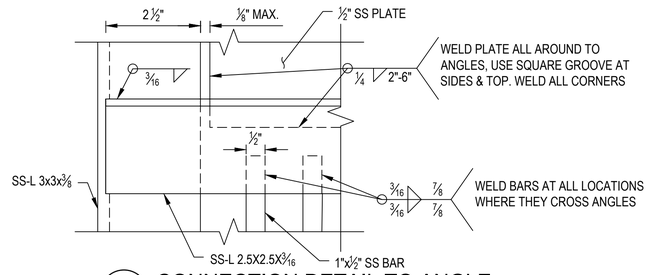
Designed By: DSN	Consor Project No.: D231747TN.02
Drawn By: CAD	Issued On: NOVEMBER 2025
Checked By: CHK	Sheet: S1
Approved By: APP	0 1/2 1 IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE

Drawing Path and Name: A:_V-TPD\Projects\TN\2023\D231747TN.02 - City of Alcoa Intake Evaluation\12 CADD\12-5 Sheets\S1.dwg, Plotted Date: November 20, 2025 4:58 PM By: Ryan Ball



1 - TOP PANEL TO SIDE PANEL CONNECTION
SCALE: 6" = 1'-0"

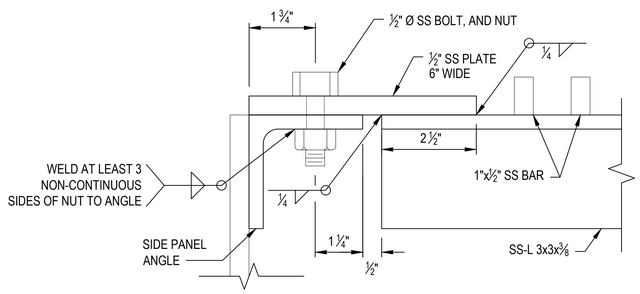
NOTE: TEST BOLT THROUGH WELDED NUT AFTER WELDING TO CONFIRM ALIGNMENT



2 - CONNECTION DETAIL TO ANGLE
SCALE: 6" = 1'-0"

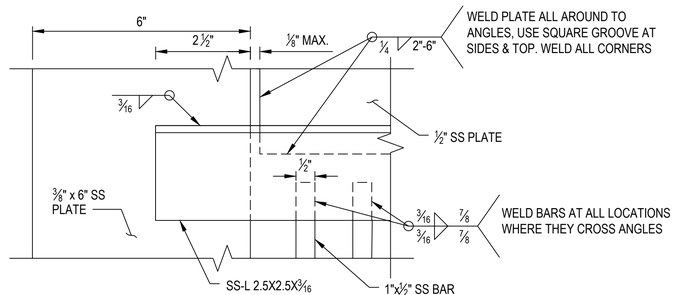
GENERAL NOTES:

1. ALL STEEL ELEMENTS INCLUDING ANGLES, PLATES, BARS, PIPES, BOLTS, NUTS, WASHERS, THREADED RODS AND ANCHORS TO BE STAINLESS STEEL ASTM A276 304 OR 316.
2. ALL WELDS SHOULD USE STAINLESS STEEL FILLER MATERIAL: 308/308L FOR SS304, AND 316/316L FOR SS316.
3. ANCHOR BOLTS MUST BE INSTALLED WITH HIT-RE 500 V3 INJECTION MORTAR OR APPROVED EQUAL. FOLLOW MANUFACTURER RECOMMENDATIONS FOR INSTALLATION.
4. ALL NUTS SHALL BE NYLON LOCK NUT, EXCEPT NUTS ON TOP ANGLE OF SIDE PANELS, WHICH ARE TO BE WELDED.
5. THE OVERALL GRATE ASSEMBLY REQUIRES TO BE FULLY ASSEMBLED TO BE STABLE WHEN INSTALLED. IF SIDE PANELS WILL BE INSTALLED PRIOR TO BOLTING THE FRONT PANEL, ADDITIONAL TEMPORARY BRACING (NOT INCLUDED IN THESE SHEETS) WILL BE REQUIRED.

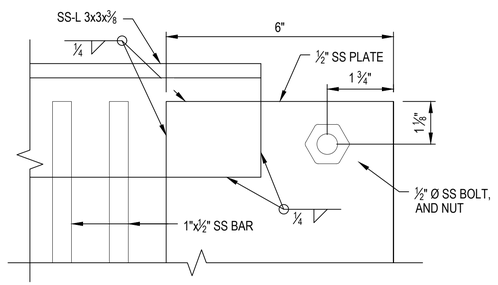


3 - TOP PANEL TO SIDE PANEL CONNECTION
SCALE: 6" = 1'-0"

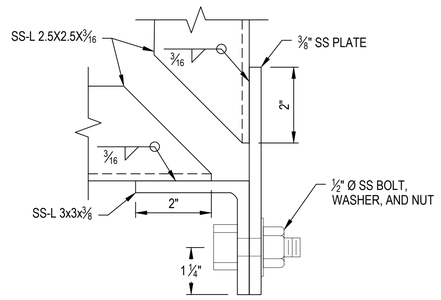
NOTE: TEST BOLT THROUGH WELDED NUT AFTER WELDING TO CONFIRM ALIGNMENT



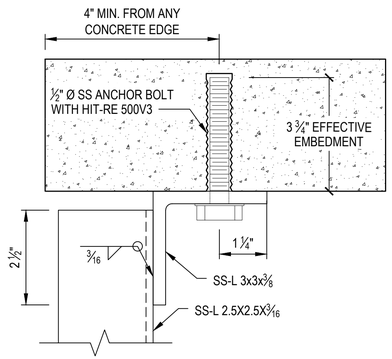
4 - CONNECTION DETAIL TO PLATE
SCALE: 6" = 1'-0"



5 - TOP PANEL DETAIL
SCALE: 6" = 1'-0"



6 - PANELS CONNECTION DETAIL
SCALE: 6" = 1'-0"



7 - ANCHOR BOLT DETAIL
SCALE: 6" = 1'-0"

Sub Consultant:

FINAL SUBMITTAL

Engineer's Seal: SERGIO MIGUEL DIAZ, REGISTERED ENGINEER, AGRICULTURE, COMMERCE, NO. 131437, STATE OF TENNESSEE

Client / Owner:

Project Title:
CITY OF ALCOA TN
WTP INTAKE PS IMPROVEMENTS

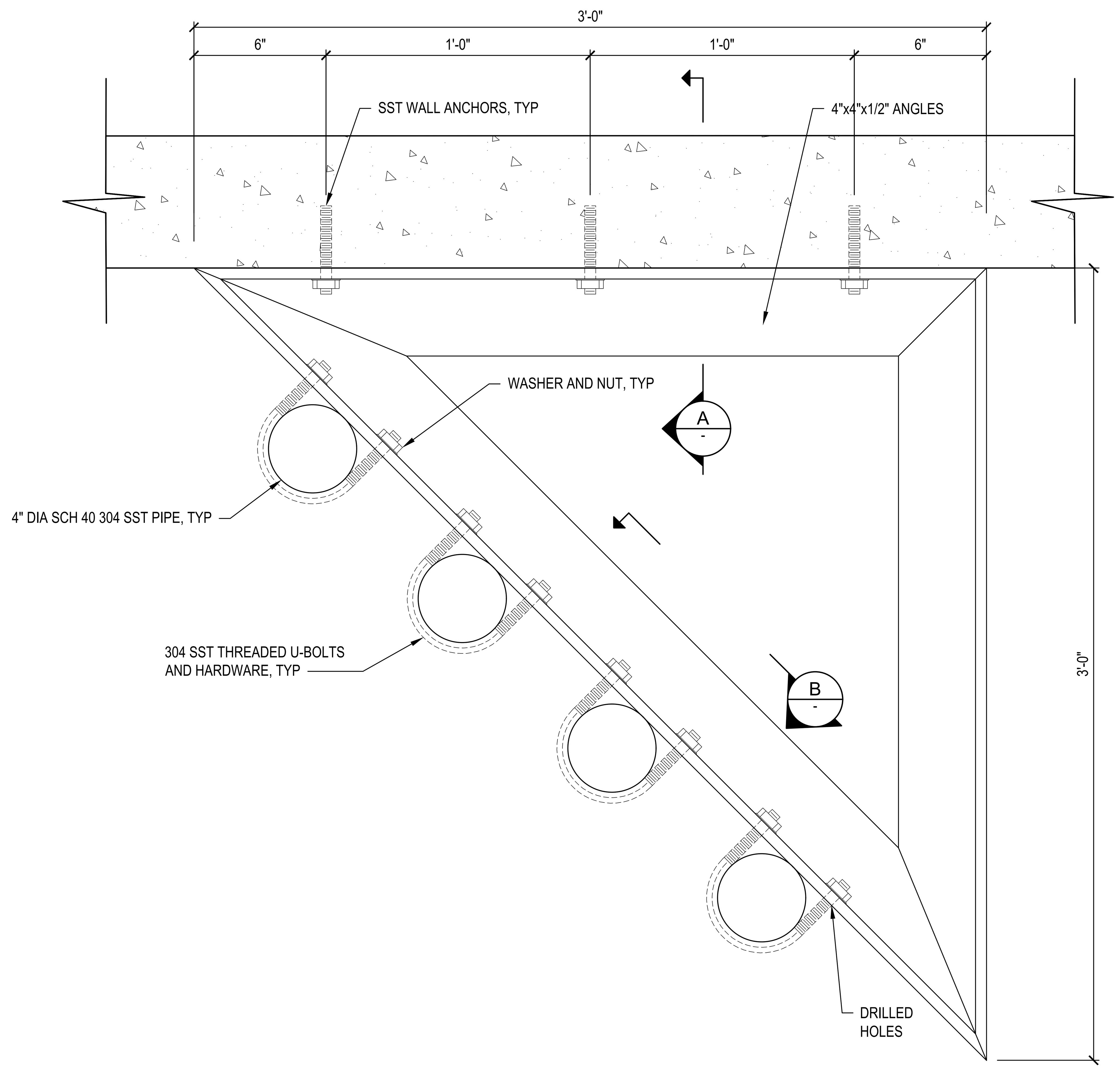
GENERAL

INTAKE GRATE CONNECTION DETAIL

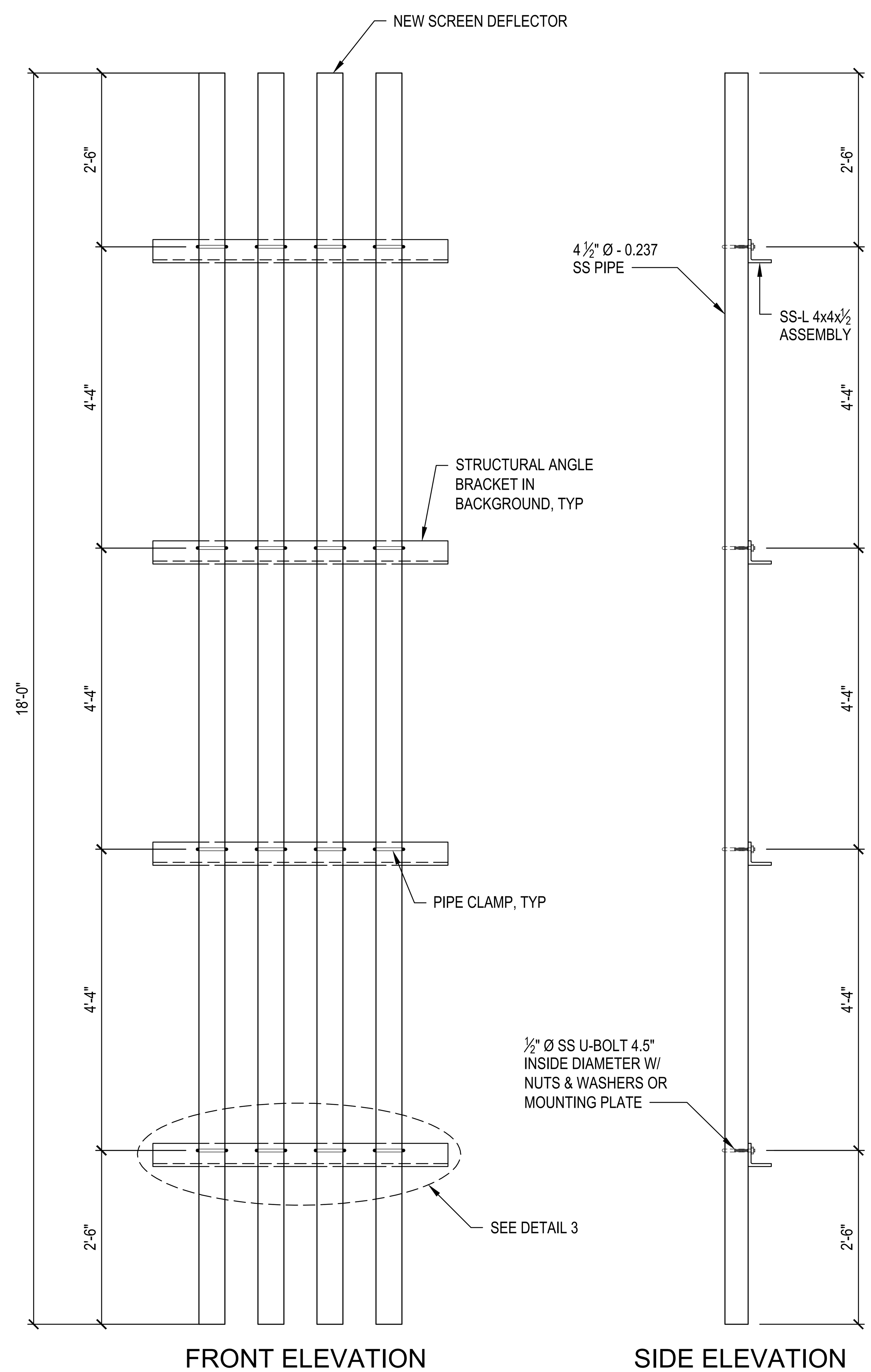
Designed By:	DSN
Drawn By:	CAD
Checked By:	CHK
Approved By:	APP
Consor Project No.:	D231747TN.02
Issued On:	NOVEMBER 2025
Sheet:	S2

0 1/2 1 IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE

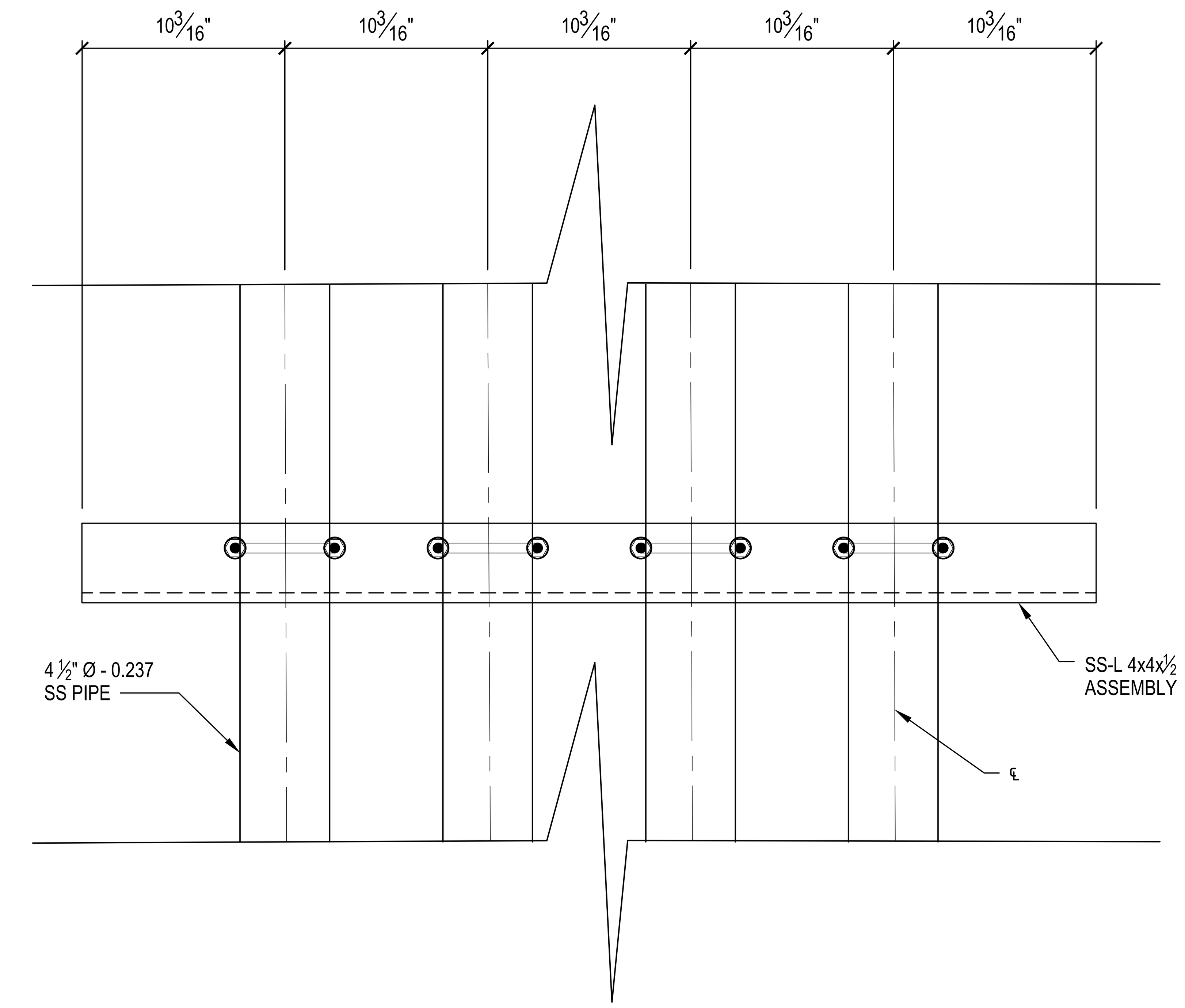
Drawing Path and Name: A:_V-TPD\Projects\TN\2023\D231747TN.02 - City of Alcoa Intake Evaluation\12 CADD\12-5 Sheets\S2.dwg, Plotted Date: November 20, 2025 4:57 PM By: Ryan Ball



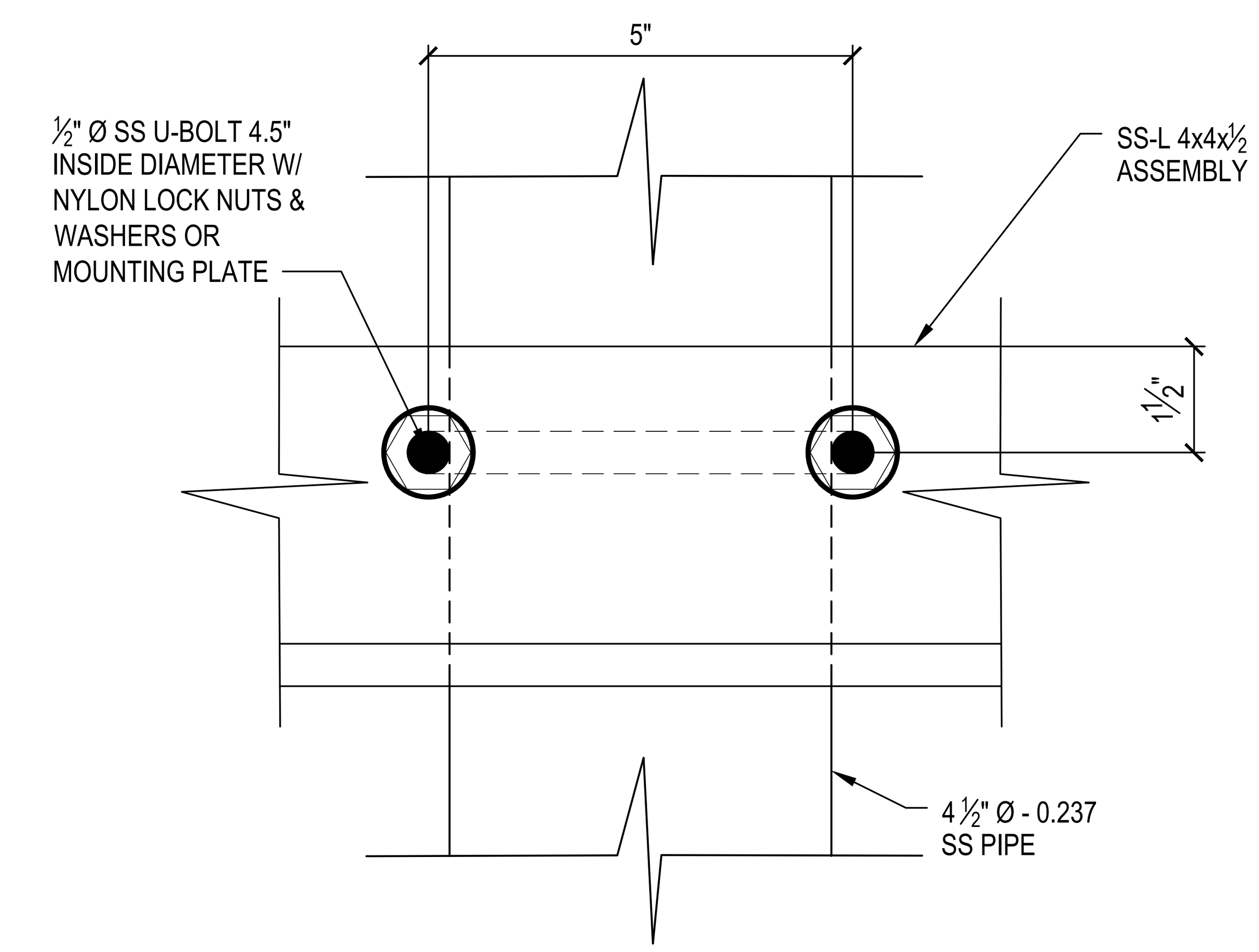
1 PLAN VIEW
SCALE: 3" = 1'-0"



2 ELEVATION VIEW
SCALE: 3/4" = 1'-0"

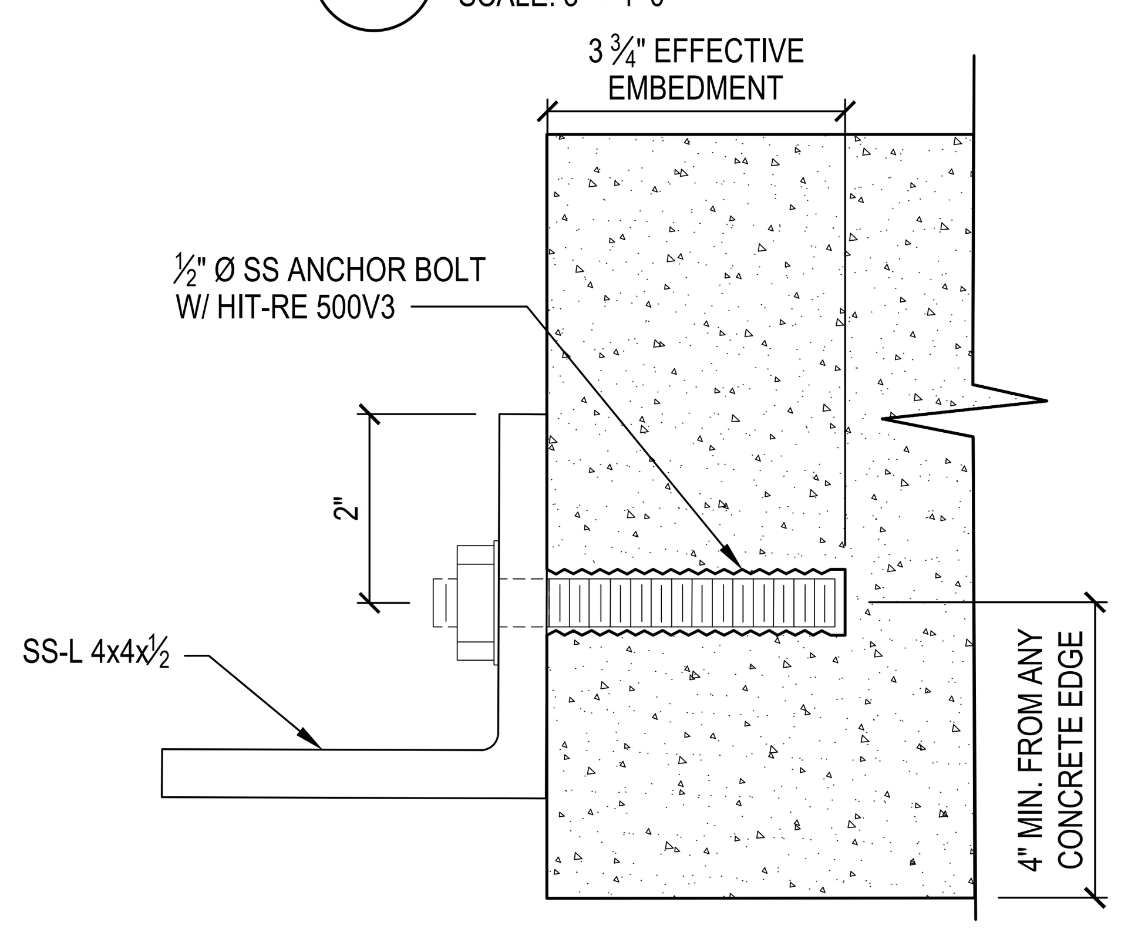


3 FRONT VIEW DETAIL
SCALE: 3/4" = 1'-0"



B PIPE ATTACHMENT VIEW
SCALE: 6" = 1'-0"

NOTE: TIGHTEN U-BOLTS NUTS WITH ENOUGH FORCE SUCH THAT THEY HOLD THE PIPES WITHOUT CAUSING EASILY-NOTICEABLE DEFORMATION



A DEFLECTOR ANCHOR DETAIL
SCALE: 6" = 1'-0"

GENERAL NOTES:

1. ALL STEEL ELEMENTS INCLUDING ANGLES, PLATES, BARS, PIPES, BOLTS, NUTS, WASHERS, THREADED RODS AND ANCHORS TO BE STAINLESS STEEL ASTM A276 304 OR 316.
2. ALL WELDS SHOULD USE STAINLESS STEEL FILLER MATERIAL: 308/308L FOR SS304, AND 316/316L FOR SS316.
3. ANCHOR BOLTS MUST BE INSTALLED WITH HIT-RE 500 V3 INJECTION MORTAR OR APPROVED EQUAL. FOLLOW MANUFACTURER RECOMMENDATIONS FOR INSTALLATION.
4. ALL NUTS SHALL BE NYLON LOCK NUT.
5. LOCATE SCREEN DEFLECTOR NO MORE THAN 5' UPSTREAM FROM INTAKE GRATE SUCH THAT THE FULL HEIGHT OF THE GRATE IS SHIELDED BY THE SCREEN DEFLECTOR

Consultant: consor

Sub Consultant:

FINAL SUBMITTAL

Engineer's Seal: STATE OF TENNESSEE REGISTERED ENGINEER AGRICULTURE COMMERCE

Client / Owner:

Project Title: CITY OF ALCOA TN WTP INTAKE PS IMPROVEMENTS

GENERAL

SCREEN DEFLECTOR DETAIL

Designed By: DSN	Consor Project No.: D231747TN.02
Drawn By: CAD	Issued On: NOVEMBER 2025
Checked By: CHK	Sheet: S3
Approved By: APP	0 1/2 1 IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE