



Meyer & Associates, Inc.
Consulting Engineers

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Water System Improvements
Lacassine Water Treatment Plant
Phase 1 – Booster Station

Jefferson Davis Parish Water & Sewer Commission #1

MA Project No. A8-23035-DA

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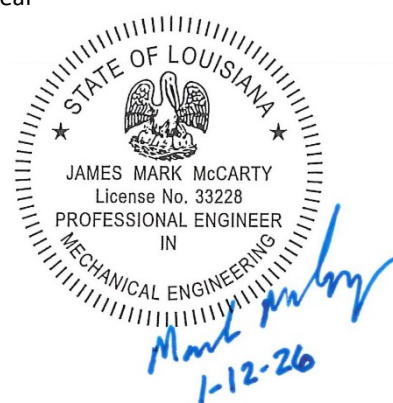
General Manager

David Trahan

Office Manager

Kathy Cormier

BID SET

			Seal 
By	Revisions	Date	

PROJECT MANUAL & CONTRACT DOCUMENTS
Jefferson Davis Parish Water & Sewer Commission #1
Lacassine Water Treatment Plant
Phase 1 – Booster Station
M.A. Project No. A8-23035-DA

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ADVERTISEMENT FOR BIDS

Issued By

Jefferson Davis Parish Water & Sewer Commission #1
5171 Aguiard Rd.
Lake Arthur, LA 70549

General Notice

Separate sealed Bids for Lacassine Water Treatment Plant, Phase 1 – Booster Station, Jefferson Davis Parish Water & Sewer Commission #1; M.A. Project No. A8-23035-DA will be received by the Jefferson Davis Parish Water & Sewer Commission #1, at the water office located at 5171 Aguiard Rd., Lake Arthur, LA 70549, until 3:00 PM, on Tuesday, February 17, 2026, and shall at that time and place be publicly opened and read aloud. Work consists of construction of a potable water booster station.

Work Classification

Work Classification: Municipal and Public Works Construction

Obtaining the Bidding Documents

Electronic copies of the Bidding Documents may be obtained from the Issuing Office of Meyer & Associates, Inc. (337) 625-8353, located at 600 N. Cities Service Hwy., Sulphur, LA 70663. A Bidding Document deposit is not required. In order to submit a bid, Bidders must obtain an original set of electronic Bidding Documents from Meyer & Associates, Inc. or the approved electronic bid website defined herein said advertisement.

Run Dates

Friday, January 16, 2026
Friday, January 23, 2026
Friday, January 30, 2026

/s/ Greg Bordelon, President

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INSTRUCTIONS TO BIDDERS FOR CONSTRUCTION CONTRACT

Prepared By



Endorsed By



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INSTRUCTIONS TO BIDDERS FOR CONSTRUCTION CONTRACT

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ARTICLE 1—DEFINED TERMS

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
- A. *Issuing Office*—The office from which the Bidding Documents are to be issued, and which registers plan holders.
 - B. *Bidding Documents Website* – The website identified in the Advertisement for Bids through which a Bidder may submit a Bid electronically. If a Bidding Document Website is not identified in the Advertisement for Bids, electronic submission of Bids will not be permitted.

ARTICLE 2—BIDDING DOCUMENTS

- 2.01 Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents). See the Agreement for a list of the Contract Documents. It is Bidder's responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misinterpretations resulting from the use of incomplete documents, by Bidder itself or by its prospective Subcontractors and Suppliers.
- 2.02 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use. Authorization to download documents, or other distribution, includes the right for plan holders to print documents solely for their use, and the use of their prospective Subcontractors and Suppliers, provided the plan holder pays all costs associated with printing or reproduction. Printed documents may not be re-sold under any circumstances.
- 2.03 Bidder must obtain an original set of electronic or paper Bidding Documents from the Issuing Office or from Bidding Documents Website identified in the Advertisement for Bids. Bidders may rely that sets of Bidding Documents obtained from the Issuing Office or Bidding Documents Website are complete, unless an omission is blatant. Registered plan holders will receive Addenda issued by the Issuing Office or the Bidding Documents Website as applicable.
- 2.04 Plan rooms (including construction information subscription services, and electronic and virtual plan rooms) may distribute the Bidding Documents, or make them available for examination. Owner is not responsible for omissions in Bidding Documents or other documents obtained from plan rooms, or for a Bidder's failure to obtain Addenda from a plan room. In order to submit a Bid, Bidder must obtain an original set of electronic or paper Bidding Documents in accordance with Paragraph 2.03.
- 2.05 *Electronic Documents*
- A. When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to the Bidders as Electronic Documents in the manner specified.
 - 1. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf). It is the intent of the Engineer and Owner that such Electronic Documents are to be exactly representative of the paper copies of the documents. However, because the Owner and Engineer cannot totally control the transmission and receipt of Electronic

Documents nor the Contractor's means of reproduction of such documents, the Owner and Engineer cannot and do not guarantee that transmissions and/or reproductions of Electronic Documents are identical in every manner to the paper copies.

- B. Unless otherwise stated in the Bidding Documents, the Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents, described in Paragraph 2.05.A above. However, Bidder assumes all risks associated with differences arising from transmission/receipt of Electronic Documents versions of Bidding Documents and reproductions prepared from those versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to derive information that is not explicitly contained in printed paper versions of the documents, and for Bidder's reliance upon such derived information.

ARTICLE 3—QUALIFICATIONS OF BIDDERS

- 3.01 In accordance with LA RS 37:2163 Bidders must hold an active Louisiana State Contractor's License unless an exemption to the referenced statute applies.
- 3.02 Within 10 days of the Bid opening, the apparent low Bidder shall submit to the Engineer:
 - A. Attestation Affidavit as required by LA RS 38:2227 (Past Criminal Convictions of Bidders), LA RS 38:2212.10 (Verification of Employees), LA RS 23:1726(B) (Certification regarding Unpaid Workers Compensation Insurance)
 - B. LA RS 38:2224 Affidavit for Attesting That Public Contract Was Not Secured Through Employment or Payment of Solicitor
 - C. Any other forms listed in the Table of Contents as "Forms to be Submitted Within 10 Days of the Bid Opening".
- 3.03 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.

ARTICLE 4—PRE-BID CONFERENCE

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

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

5.01 *Site and Other Areas*

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

5.02 *Existing Site Conditions*

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

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

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

5.03 *Other Site-related Documents*

- A. No other Site-related documents are available.

5.04 *Site Visit and Testing by Bidders*

- A. Bidder is required to visit the Site and conduct a thorough visual examination of the Site and adjacent areas. During the visit the Bidder must not disturb any ongoing operations at the Site.
- B. Bidders visiting the Site are required to arrange their own transportation to the Site.
- C. All access to the Site other than during a regularly scheduled Site visit must be coordinated through the Owner for visiting the Site. Bidder must conduct the required Site visit during normal working hours.
- D. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder general access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site. Bidder is responsible for establishing access needed to reach specific selected test sites.
- E. Bidder must comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
- F. Bidder must fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

5.05 *Owner's Safety Program*

- A. Site visits and work at the Site may be governed by an Owner safety program.

5.06 *Other Work at the Site*

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

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

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

- A. The Bid Form that each Bidder will submit contains express representations regarding the Bidder's examination of Project documentation, Site visit, and preparation of the Bid. Bidder should review these representations and certifications, and assure that Bidder can make the representations and certifications in good faith, before executing and submitting its Bid.
- B. If Bidder is awarded the Contract, Bidder (as Contractor) will make similar express representations and certifications when it executes the Agreement.

ARTICLE 7—INTERPRETATIONS AND ADDENDA

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

ARTICLE 8—BID SECURITY

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of five percent (5%) of Bidder's maximum Bid price (determined by adding the base bid and all alternates). Security shall be in the form of a certified check, cashier's check, or Bid bond issued by a surety meeting the requirements of Paragraph 6.01 of the General Conditions. Such Bid bond shall be issued in the form included in the Bidding Documents.
- 8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract and furnish the required Contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited in whole. Such forfeiture will be Owner's exclusive remedy if Bidder defaults.
- 8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of 7 days after the Effective Date of the Contract or 46 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.
- 8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within 7 days after the Bid opening.

ARTICLE 9—CONTRACT TIMES

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

ARTICLE 10—SUBSTITUTE AND “OR EQUAL” ITEMS

- 10.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, and those “or-equal” or substitute materials and equipment approved by the Engineer.
- 10.02 Whenever the Bidding Documents specify that an “approved equal” material or equipment may be furnished or used, application for such acceptance shall be made via a Shop Drawing or Submittal after the Effective Date of the Contract in accordance with Paragraphs 7.05 and 7.06 of the General Conditions.
- 10.03 Whenever the Bidding Documents specify that a “prior-approved equal” material or equipment may be furnished or used, application for such acceptance shall be submitted in writing by the Bidder and received by the Engineer at least 14 working days prior to the Bid opening. Each such request must comply with the requirements of Paragraphs 7.05 and 7.06 of the General Conditions, and the review of the request will be governed by the principles in those paragraphs. The burden of proof of the merit of the proposed item is upon Bidder. Engineer’s decision of approval or disapproval of a proposed item will be final. If Engineer approves any such proposed item, such approval will be set forth in an Addendum issued to all registered Bidders. Bidders cannot rely upon approvals made in any other manner.
- 10.04 All prices that Bidder sets forth in its Bid will be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of “or-equal” or substitution requests are made at Bidder’s sole risk.

ARTICLE 11—SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 11.01 Upon request from the Owner or Engineer, the apparent Successful Bidder, and any other Bidder so requested, must submit a list of the Subcontractors or Suppliers proposed for the Work within ten days of the request.
- 11.02 If requested, such list must be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor or Supplier. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor or Supplier, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder will submit a substitute, without an increase in Bid price.
- 11.03 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors and Suppliers. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor or Supplier, so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.07 of the General Conditions.

ARTICLE 12—PREPARATION OF BID

- 12.01 The Bid Form is included with the Bidding Documents.
- A. All blanks on the Bid Form must be completed in ink and the Bid Form signed in ink. Alterations must be scratched through and initialed in ink by the Bidder or person who submits the Bid Form.
 - B. A Bid price must be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein. If Bidder elects to not furnish pricing for an alternate item, then Bidder may enter the words “No Bid” or “Not Applicable.”
- 12.02 If Bidder has obtained the Bidding Documents as Electronic Documents, then Bidder shall prepare its Bid on a paper copy of the Bid Form printed from the Electronic Documents version of the Bidding Documents. The printed copy of the Bid Form must be clearly legible, printed on 8½ inch by 11-inch paper and as closely identical in appearance to the Electronic Document version of the Bid Form as may be practical.
- 12.03 A Bid must contain a corporate resolution or written evidence of authority of the person signing the Bid in accordance with LA RS 38:2212.B(5).
- 12.04 The Bid must contain an acknowledgment of receipt of all Addenda, the numbers of which must be filled in on the Bid Form.

ARTICLE 13—BASIS OF BID

- 13.01 *Lump Sum*
- A. Bidders must submit a Bid on a lump sum basis as set forth in the Bid Form.
- 13.02 *Base Bid with Alternates*
- A. Bidders must submit a Bid on a lump sum basis for the base Bid and include a separate price for each alternate described in the Bidding Documents and as provided for in the Bid Form. The price for each alternate will be the amount added to or deleted from the base Bid if Owner selects the alternate.
- 13.03 *Unit Price*
- A. Bidders must submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form.
 - B. The “Bid Price” (sometimes referred to as the extended price) for each unit price Bid item will be the product of the “Estimated Quantity”, which Owner or its representative has set forth in the Bid Form, for the item and the corresponding “Bid Unit Price” offered by the Bidder. The total of all unit price Bid items will be the sum of these “Bid Prices”; such total will be used by Owner for Bid comparison purposes. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.
 - C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

ARTICLE 14—SUBMITTAL OF BID

- 14.01 A Bid must be received no later than the date and time prescribed and at the place indicated in the Advertisement or invitation to bid and must be enclosed in a plainly marked package with the Project title, and, if applicable, the designated portion of the Project for which the Bid is submitted and the name and address of Bidder. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid must be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid must be addressed to the location designated in the Advertisement.
- 14.02 In accordance with LA RS 37:2163, all Bidders must show their Louisiana State Contractor's License number on the Bid envelope. Any Bid that does not require the Bidder to hold an active Louisiana State Contractor's License shall state the exemption on the Bid envelope. Any Bid failing to meet these provisions will not be opened.
- 14.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

ARTICLE 15—MODIFICATION AND WITHDRAWAL OF BID

- 15.01 An unopened Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 15.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 15.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 15.03 In accordance with LA RS 38:2214, Bids containing patently obvious, unintentional, and substantial mechanical, clerical, or mathematical errors, or errors of unintentional omission of a substantial quantity of work, labor, material, or services made directly in the compilation of the Bid, may be withdrawn by the Bidder if clear and convincing sworn, written evidence of such errors is furnished to the Owner within 48 hours after Bids are opened. If the Owner determines that the error was a patently obvious mechanical, clerical, or mathematical error, or unintentional omission of a substantial quantity of work, labor, material, or services, as opposed to an error in judgement, and that the Bid was submitted in good faith, the Bid security will be returned. Thereafter, if the Work is rebid, the Bidder will be disqualified from further bidding on the Work.

ARTICLE 16—OPENING OF BIDS

- 16.01 Bids will be opened at the time and place indicated in the Advertisement or invitation to bid and, unless obviously non-responsive, read aloud publicly.

ARTICLE 17—BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 17.01 All Bids will remain subject to acceptance for up to 45 days following the date of the Bid opening; however, the Owner and the lowest responsible and responsive Bidder, by mutually written consent, may agree to extend the deadline for award by one or more extensions of 30 calendar

days. Owner may, at its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 18—EVALUATION OF BIDS AND AWARD OF CONTRACT

- 18.01 Owner reserves the right to reject any or all Bids for just cause in accordance with LA RS 38:2214. In accordance with LA RS 38:2212(B)(1), the provisions and requirements of this Section, and those stated in the bidding documents shall not be waived by the entity.
- 18.02 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible.
- 18.03 If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, whether in the Bid itself or in a separate communication to Owner or Engineer, then Owner will reject the Bid as nonresponsive.
- 18.04 *Evaluation of Bids*
 - A. In evaluating Bids, Owner will consider whether the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.
 - B. For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.
- 18.05 If Owner awards the contract for the Work, such award will be to the responsible Bidder submitting the lowest responsive Bid.

ARTICLE 19—BONDS AND INSURANCE

- 19.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds, other required bonds (if any), and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by required bonds and insurance documentation. Such bonds shall be issued using the forms included in the Bidding Documents.
- 19.02 Article 8, Bid Security, of these Instructions, addresses any requirements for providing bid bonds as part of the bidding process. In accordance with LA RS 38:2218.C, if a bid bond is used, it shall be written by a surety or insurance company currently on the U.S. Department of Treasury Financial Management Service list of approved bonding companies which is published annually in the Federal Register, or by a Louisiana domiciled insurance company with at least an A- rating in the latest printing of the A.M. Best's Key Rating Guide to write individual bonds up to ten percent of policy holders' surplus as shown in the A.M. Best's Key Rating Guide or by an insurance company in good standing licensed to write bid bonds which is either domiciled in Louisiana or owned by Louisiana residents.

ARTICLE 20—SIGNING OF AGREEMENT

- 20.01 Owner will issue the unexecuted Agreement and counterparts to the Successful Bidder. Within 15 days thereafter, Successful Bidder must execute and deliver the required number of copies of

the Agreement and any bonds and insurance documentation required to be delivered by the Contract Documents to Owner.

- 20.02 In accordance with LA RS 38:2215, the Successful Bidder and Owner shall execute the Contract not later than 60 days after the date of Contract award.
- 20.03 Owner will deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions at the preconstruction meeting.

ARTICLE 21—SALES AND USE TAXES

- 21.01 Owner is exempt from Louisiana state sales and use taxes on materials and equipment to be incorporated in the Work. Said taxes must not be included in the Bid. Refer to Paragraph SC-7.10 of the Supplementary Conditions for additional information.

LOUISIANA UNIFORM PUBLIC WORK BID FORM

TO: Jefferson Davis Parish Water & Sewer Commission #1
5171 Aguiard Rd.
Lake Arthur, LA 70549

BID FOR: Water System Improvements
Lacassine Water Treatment Plant
Phase 1 – Booster Station
M.A. Project No. A8-23035-DA

The undersigned bidder hereby declares and represents that she/he; a) has carefully examined and understands the Bidding Documents, b) has not received, relied on, or based his bid on any verbal instructions contrary to the Bidding Documents or any addenda, c) has personally inspected and is familiar with the project site, and hereby proposes to provide all labor, materials, tools, appliances and facilities as required to perform, in a workmanlike manner, all work and services for the construction and completion of the referenced project, all in strict accordance with the Bidding Documents prepared by: Meyer & Associates, Inc. and dated: January 2026.

Bidders must acknowledge all addenda. The Bidder acknowledges receipt of the following **ADDENDA:** (Enter the number the Designer has assigned to each of the addenda that the Bidder is acknowledging) _____.

TOTAL BASE BID: For all work required by the Bidding Documents (including any and all unit prices designated "Base Bid" * but not alternates) the sum of:

_____ Dollars (\$ _____)

ALTERNATES: For any and all work required by the Bidding Documents for Alternates including any and all unit prices designated as alternates in the unit price description.

Alternate No. 1 – Add fencing for eastern portion of site for the lump sum of:

_____ Dollars (\$ _____)

Alternate No. 2 – Furnish & install a prestressed concrete ground storage tank in lieu of a glass fused to steel bolted ground storage tank for the lump sum of:

_____ Dollars (\$ _____)

Alternate No. 3 – Add earthwork for future structures for the lump sum of:

_____ Dollars (\$ _____)

NAME OF BIDDER: _____

ADDRESS OF BIDDER: _____

LOUISIANA CONTRACTOR'S LICENSE NUMBER: _____

NAME OF AUTHORIZED SIGNATORY OF BIDDER: _____

TITLE OF AUTHORIZED SIGNATORY OF BIDDER: _____

SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER **: _____

DATE: _____

THE FOLLOWING ITEMS ARE TO BE INCLUDED WITH THE SUBMISSION OF THIS LOUISIANA UNIFORM PUBLIC WORK BID FORM:

* The Unit Price Form shall be used if the contract includes unit prices. Otherwise it is not required and need not be included with the form. The number of unit prices that may be included is not limited and additional sheets may be included if needed.

** **A CORPORATE RESOLUTION OR WRITTEN EVIDENCE** of the authority of the person signing the bid for the public work as prescribed by LA R.S. 38:2212(B)(5).

BID SECURITY in the form of a bid bond, certified check or cashier's check as prescribed by LA RS 38:2218(A) is attached to and made a part of this bid.

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BID BOND (PENAL SUM FORM)

Bidder Name: [Full formal name of Bidder] Address <i>(principal place of business)</i> : [Address of Bidder's principal place of business]	Surety Name: [Full formal name of Surety] Address <i>(principal place of business)</i> : [Address of Surety's principal place of business]
Owner Name: [Full formal name of Owner] Address <i>(principal place of business)</i> : [Address of Owner's principal place of business]	Bid Project <i>(name and location)</i> : [Owner project/contract name, and location of the project] Bid Due Date: [Enter date bid is due]
Bond Penal Sum: [Amount] Date of Bond: [Date]	
Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.	
Bidder	Surety
_____ <i>(Full formal name of Bidder)</i>	_____ <i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature) (Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<i>Notes: (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.</i>	

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

**FORMS TO BE SUBMITTED WITHIN
10 DAYS OF THE BID OPENING**

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Name of Project

Project No.

STATE OF _____

PARISH OF _____

ATTESTATIONS AFFIDAVIT

Before me, the undersigned notary public, duly commissioned and qualified in and for the parish and state aforesaid, personally came and appeared Affiant, who after being duly sworn, attested as follows:

LA. R.S. 38:2227 PAST CRIMINAL CONVICTIONS OF BIDDERS

- A. No sole proprietor or individual partner, incorporator, director, manager, officer, organizer, or member who has a minimum of a ten percent (10%) ownership in the bidding entity named below has been convicted of, or has entered a plea of guilty or nolo contendere to any of the following state crimes or equivalent federal crimes:

(a) Public bribery (R.S. 14:118)
(b) Corrupt influencing (R.S. 14:120)

(c) Extortion (R.S. 14:66)
(d) Money laundering (R.S. 14:230)

- B. Within the past five years from the project bid date, no sole proprietor or individual partner, incorporator, director, manager, officer, organizer, or member who has a minimum of a ten percent (10%) ownership in the bidding entity named below has been convicted of, or has entered a plea of guilty or nolo contendere to any of the following state crimes or equivalent federal crimes, during the solicitation or execution of a contract or bid awarded pursuant to the provisions of Chapter 10 of Title 38 of the Louisiana Revised Statutes:

(a) Theft (R.S. 14:67)
(b) Identity Theft (R.S. 14:67.16)
(c) Theft of a business record
(R.S.14:67.20)
(d) False accounting (R.S. 14:70)
(e) Issuing worthless checks
(R.S. 14:71)

(f) Bank fraud (R.S. 14:71.1)
(g) Forgery (R.S. 14:72)
(h) Contractors; misapplication of
payments (R.S. 14:202)
(i) Malfeasance in office (R.S. 14:134)

LA. R.S. 38:2212.10 Verification of Employees

- A. At the time of bidding, Appearer is registered and participates in a status verification system to verify that all new hires in the state of Louisiana are legal citizens of the United States or are legal aliens.
- B. If awarded the contract, Appearer shall continue, during the term of the contract, to utilize a status verification system to verify the legal status of all new employees in the state of Louisiana.
- C. If awarded the contract, Appearer shall require all subcontractors to submit to it a sworn affidavit verifying compliance with Paragraphs (A) and (B) of this Subsection.

Name of Project

Project No.

LA. R.S. 23:1726(B) Certification Regarding Unpaid Workers Compensation Insurance

- A. R.S. 23:1726 prohibits any entity against whom an assessment under Part X of Chapter 11 of Title 23 of the Louisiana Revised Statutes of 1950 (Alternative Collection Procedures & Assessments) is in effect, and whose right to appeal that assessment is exhausted, from submitting a bid or proposal for or obtaining any contract pursuant to Chapter 10 of Title 38 of the Louisiana Revised Statutes of 1950 and Chapters 16 and 17 of Title 39 of the Louisiana Revised Statutes of 1950.
- B. By signing this bid /proposal, Affiant certifies that no such assessment is in effect against the bidding / proposing entity.

NAME OF BIDDER

NAME OF AUTHORIZED SIGNATORY OF BIDDER

DATE

TITLE OF AUTHORIZED SIGNATORY OF BIDDER

**SIGNATURE OF AUTHORIZED
SIGNATORY OF BIDDER/AFFIANT**

Sworn to and subscribed before me by Affiant on the ____ day of _____, 20__.

Notary Public

**AFFIDAVIT
FOR
ATTESTING THAT PUBLIC CONTRACT WAS NOT SECURED
THROUGH EMPLOYMENT OR PAYMENT OF SOLICITOR**

To be executed by all contractors, subcontractors, persons, corporations, firms, associations, or other organizations receiving value for services rendered in connection with this project:

STATE OF _____
PARISH OR COUNTY OF _____

_____, Being first duly sworn,
deposes and says that:

(1) He is _____ of _____
(Title) (Company Name)
the/a Contractor, Subcontractor, Person, Corporation, Firm, Association, or other organization receiving value for services rendered in connection with this Project;

(2) He employed no person, corporation, firm, association, or other organization, either directly or indirectly, to secure this public contract under which he is to receive payment, other than persons regularly employed by the affiant whose services in connection with this project or in securing this public contract were in the regular course of their duties for affiant; and

(3) That no part of the contract price to be received by affiant was paid or will be paid to any person, corporation, firm, association, or other organization for soliciting the contract, other than payment of their normal compensation to persons regularly employed by the affiant whose services in connection with the project are/were in the normal course of their duties for affiant.

Signed: _____

Title: _____

SWORN TO AND SUBSCRIBED before me
this ____ day of ____, 20____.

NOTARY PUBLIC
My Commission Expires _____

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**POST BID CONTRACT
RELATED DOCUMENTS**

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Public Projects Contractor/Subcontractor
Sales Tax Certification and Exemption Application
Louisiana Revised Statute 47:305.7(A)(1)(b)

For questions about this form, please contact:
 Louisiana Department of Revenue
 Taxpayer Compliance - SES Division
 Phone: (855) 307-3893
 Email: LDRSales.ExemptionApplications@la.gov

This form is for use by contractors and subcontractors when applying for certification and exemption from the collection of sales tax in accordance with La. R.S. 47:305.7(A)(1)(b).

Please complete the application below and return it via email to LDRSales.ExemptionApplications@la.gov along with a copy of the executed contract.

Applicant Information			
Contractor Legal Name		LDR Sales Tax Account Number	
Contractor Trade Name			
Physical Address	City	State	ZIP
Mailing Address	City	State	ZIP
Contact Person	Contact Number		
Email Address			

Public Entity Information	
Public Entity	LDR Sales Tax Account Number <i>(if applicable)</i>

Contract Information		
Contract Number	Contract Beginning Date <i>(mm/dd/yyyy)</i>	Contract End Date <i>(mm/dd/yyyy)</i>
Contract Description		

Please select the legal status of the public entity listed above:

☐ State agency, board, or commission	☐ Parish school board or public school
☐ Municipal government or instrumentality thereof	☐ Law enforcement district
☐ Public charter school (La. R.S. 17:3971-4001)	☐ Waterworks district
☐ Hospital service district	☐ Parish and municipal libraries
☐ Public housing authority	☐ Other _____
☐ Parish government or instrumentality thereof	

Under the penalty of perjury, I declare that I am authorized to sign this application on behalf of the above named contractor, and that I have examined this application, and to the best of my knowledge, it is true, correct, and complete.

Name <i>(Please print)</i>	Title
Signature	Date <i>(mm/dd/yyyy)</i>

A copy of the contract with all parties' signatures must be attached to the application. Failure to provide a copy of the contract will result in delays in the evaluation process.

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NOTICE OF AWARD

Date of Award:

Owner:

Owner's Project No.:

Engineer:

Engineer's Project No.:

Project:

Bidder:

Bidder's Address:

You are notified that Owner has accepted your Bid dated [Click or tap to enter a date.](#), for the above Contract, and that you are the Successful Bidder.

Contract award is for the Total Base Bid. The Contract Price of the awarded Contract is . Contract Price is subject to adjustment based on the provisions of the Contract, including but not limited to those governing changes and Unit Price Work, as applicable.

Unexecuted copies of the Agreement, Contract security, and other contract or funding agency related forms requiring execution, as applicable, either accompany this Notice of Award or will be sent under separate cover.

Within 15 days of your receipt of these items, you must deliver the following to the Engineer:

1. Executed Agreement(s)
2. Executed Contract security (such as required performance and payment bonds)
3. Other executed contract or funding agency related forms, as applicable
4. Insurance documentation, as specified in the Instructions to Bidders and in the General Conditions, Articles 2 and 6.

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

In accordance with LA RS 38:2215, Contractor and Owner shall execute the Agreement no later than 60 calendar days after the date of Contract award.

Owner:

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

Copy: Engineer

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

Prepared By



Endorsed By



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National Society of Professional Engineers
1420 King Street, Alexandria, VA 22314-2794
(703) 684-2882
www.nspe.org

American Council of Engineering Companies
1015 15th Street N.W., Washington, DC 20005
(202) 347-7474
www.acec.org

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400
(800) 548-2723
www.asce.org

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

This Agreement is by and between Jefferson Davis Parish Water & Sewer Commission #1 ("Owner") and _____ ("Contractor").

Terms used in this Agreement have the meanings stated in the General Conditions and the Supplementary Conditions. Owner and Contractor hereby agree as follows:

ARTICLE 1—WORK

- 1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows: Lacassine Water Treatment Plant, Phase 1 – Booster Station

ARTICLE 2—THE PROJECT

- 2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: Lacassine Water Treatment Plant, Phase 1 – Booster Station

ARTICLE 3—ENGINEER

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

ARTICLE 4—CONTRACT TIMES

4.01 *Time is of the Essence*

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

4.02 *Contract Times: Days*

- A. The Work will be substantially complete within 360 calendar days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within 405 calendar days after the date when the Contract Times commence to run.

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 Contract Times, as duly modified. The parties also recognize the delays, expense, and difficulties involved in proving, in a legal or arbitration proceeding, the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. *Substantial Completion:* Contractor shall pay Owner \$700 for each calendar day that expires after the time (as duly adjusted pursuant to the Contract) specified above for Substantial Completion, until the Work is substantially complete.
 2. *Completion of Remaining Work:* After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$700 for each calendar day that expires after such time until the Work is completed and ready for final payment.
 3. Liquidated damages for failing to timely attain Milestones, Substantial Completion, and final completion are not additive, and will not be imposed concurrently.
- B. If Owner recovers liquidated damages for a delay in completion by Contractor, then such liquidated damages are Owner's sole and exclusive remedy for such delay, and Owner is precluded from recovering any other damages, whether actual, direct, excess, or consequential, for such delay, except for special damages (if any) specified in this Agreement.

ARTICLE 5—CONTRACT PRICE

- 5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents, the amounts that follow, subject to adjustment under the Contract:
- A. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit, and as adjusted for the actual quantity of any unit price items.
 1. Contract price as of the Effective Date of the Contract is \$_____.
 2. For all Unit Price Work, the actual payment amount will be equal to the sum of the extended prices (established for each separately identified item of Unit Price Work by multiplying the unit price times the actual quantity of that item). The extended prices for Unit Price Work set forth as of the Effective Date of the Contract are based on estimated quantities. As provided in Paragraph 13.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer.

ARTICLE 6—PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

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

6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on the basis of Contractor's Applications for Payment on or about the date each month to be established at the preconstruction meeting based on Owner's meeting schedule 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 Final Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract. Retainage indicated below does not include withholdings for known incomplete work. Withholdings for known incomplete work will be made over and above the retainage values indicated below.
 - a. For Contract Prices less than \$500,000, 90% of the Work completed and/or cost of materials and equipment received and properly stored but not incorporated in the Work (with the balance of 10% being retainage).
 - b. For Contract Prices of \$500,000 or more, 95% of the Work completed and/or cost of materials and equipment received and properly stored but not incorporated in the Work (with the balance of 5% being retainage).

6.03 *Final Payment*

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

6.04 *Interest*

- A. All amounts not paid within 45 calendar days of when due will bear interest at the rate $\frac{1}{2}$ percent accumulated daily, not to exceed 15 percent.

ARTICLE 7—CONTRACT DOCUMENTS

7.01 *Contents*

- A. The Contract Documents consist of all of the following:
 1. This Agreement.
 2. Bonds:
 - a. Performance bond (together with power of attorney).
 - b. Payment bond (together with power of attorney).
 3. General Conditions.
 4. Supplementary Conditions.
 5. Specifications as listed in the table of contents of the project manual.
 6. Drawings (not attached but incorporated by reference) consisting of 51 sheets with each sheet bearing the Project name and dated January 2026.
 8. Addenda (numbers to , inclusive).
 9. Exhibits to this Agreement (enumerated as follows):
 - a. Contractor's Bid.
 - b. Attestations Affidavit.
 - c. Affidavit Attesting that Public Contract was not Secured through Employment or Payment of Solicitor.

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.
 - b. Work Change Directives.
 - c. Change Orders.
 - d. Field Orders.
 - e. Warranty Bond, if any.
- B. The Contract Documents listed in Paragraph 7.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 7.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

ARTICLE 8—REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS

8.01 Contractor's Representations

- A. In order to induce Owner to enter into this Contract, Contractor makes the following representations:
 1. Contractor has examined and carefully studied the Contract Documents, including Addenda.
 2. Contractor has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 3. Contractor is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
 4. Contractor has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
 5. Contractor has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
 6. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (c) Contractor's safety precautions and programs.

7. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
8. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
9. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
10. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

8.02 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 8.02:
 1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;
 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

8.03 *Standard General Conditions*

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

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

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

Owner:

Contractor:

(typed or printed name of organization)

(typed or printed name of organization)

By: _____
(individual's signature)

By: _____
(individual's signature)

Date: _____
(date signed)

Date: _____
(date signed)

Name: _____
(typed or printed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Title: _____
(typed or printed)

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

Attest: _____
(individual's signature)

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Title: _____
(typed or printed)

Address for giving notices:

Address for giving notices:

Designated Representative:

Designated Representative:

Name: _____
(typed or printed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

Address:

Phone: _____

Phone: _____

Email: _____

Email: _____

(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.)

License No.: _____
(where applicable)

State: _____

PERFORMANCE BOND

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

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

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

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

14. Definitions

- 14.1. *Balance of the Contract Price*—The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
 - 14.2. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.
 - 14.3. *Contractor Default*—Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.
 - 14.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
 - 14.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
16. Modifications to this Bond are as follows: None

PAYMENT BOND

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

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

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

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

NOTICE TO PROCEED

Owner: _____ Owner's Project No.: _____
Engineer: _____ Engineer's Project No.: _____
Contractor: _____
Project: _____
Effective Date of Contract: _____

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on [Click or tap to enter a date.](#), pursuant to Paragraph 4.01 of the General Conditions.

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work will be done at the Site prior to such date.

In accordance with the Agreement:

The number of days to achieve Substantial Completion is _____ from the date stated above for the commencement of the Contract Times, resulting in a date for Substantial Completion of _____; and the number of days to achieve readiness for final payment is _____ from the commencement date of the Contract Times, resulting in a date for readiness for final payment of _____.

Before starting any Work at the Site, Contractor must comply with the following:

Owner: _____
By (*signature*): _____
Name (*printed*): _____
Title: _____
Date Issued: _____
Copy: Engineer

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WORK CHANGE DIRECTIVE NO.: [Number of Work Change Directive]

Owner:

Owner's Project No.:

Engineer:

Engineer's Project No.:

Contractor:

Contractor's Project No.:

Project:

Date Issued:

Effective Date of Work Change Directive:

Contractor is directed to proceed promptly with the following change(s):

Description:

[Description of the change to the Work]

Attachments:

[List documents related to the change to the Work]

Purpose for the Work Change Directive:

[Describe the purpose for the change to the Work]

Directive to proceed promptly with the Work described herein, prior to agreeing to change in Contract Price and Contract Time, is issued due to:

Notes to User—Check one or both of the following

☐ Non-agreement on pricing of proposed change. ☐ Necessity to proceed for schedule or other reasons.

Estimated Change in Contract Price and Contract Times (non-binding, preliminary):

Contract Price: \$ _____ **[increase] [decrease] [not yet estimated].**

Contract Time: _____ days **[increase] [decrease] [not yet estimated].**

Basis of estimated change in Contract Price:

☐ Lump Sum ☐ Unit Price ☐ Cost of the Work ☐ Other

Recommended by Engineer

Authorized by Owner

By:

Title:

Date:

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CHANGE ORDER NO.:

Owner: _____ Owner's Project No.: _____
Engineer: Meyer & Associates, Inc. Engineer's Project No.: _____
Contractor: _____ Contractor's Project No.: _____
Project: _____
Contract Date: _____ Date of Notice to Proceed: _____
Date Issued: _____ Effective Date of Change Order: _____

The Contract is modified as follows upon execution of this Change Order:

Description:

Attachments:

Change in Contract Price	Change in Contract Times
Original Contract Price: \$ _____	Original Contract Times: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] from previously approved Change Orders No. 1 to No. [Number of previous Change Order] : \$ _____	[Increase] [Decrease] from previously approved Change Orders No.1 to No. [Number of previous Change Order] : Substantial Completion: _____ Ready for final payment: _____
Contract Price prior to this Change Order: \$ _____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] this Change Order: \$ _____	[Increase] [Decrease] this Change Order: Substantial Completion: _____ Ready for final payment: _____
Contract Price incorporating this Change Order: \$ _____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for final payment: _____

Recommended by Engineer (if required)

Accepted by Contractor

By: _____
Title: _____
Date: _____

Authorized by Owner

Approved by Funding Agency (if applicable)

By: _____
Title: _____
Date: _____

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FIELD ORDER NO.: [Number of Field Order]

Owner:

Owner's Project No.:

Engineer:

Engineer's Project No.:

Contractor:

Contractor's Project No.:

Project:

Date Issued:

Effective Date of Field Order:

Contractor is hereby directed to promptly perform the Work described in this Field Order, issued in accordance with Paragraph 11.04 of the General Conditions, for minor changes in the Work without changes in Contract Price or Contract Times. If Contractor considers that a change in Contract Price or Contract Times is required, submit a Change Proposal before proceeding with this Work.

Reference:

Specification Section(s):

Drawing(s) / Details (s):

Description:

[Description of the change to the Work]

Attachments:

[List documents supporting change]

Issued by Engineer

By: _____

Title: _____

Date: _____

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CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner: _____ Owner's Project No.: _____
Engineer: Meyer & Associates, Inc. Engineer's Project No.: _____
Contractor: _____ Contractor's Project No.: _____
Project: _____

This ☐ Preliminary ☐ Final Certificate of Substantial Completion applies to:

☐ All Work ☐ The following specified portions of the Work:

Date of Substantial Completion: _____

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work must be as provided in the Contract, except as amended as follows:

Amendments to Owner's Responsibilities: ☒ None ☐ As follows:

Amendments to Contractor's Responsibilities: ☒ None ☐ As follows:

The following documents are attached to and made a part of this Certificate:

Punch List

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Recommended by Engineer:

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

Accepted by Contractor:

By *(signature)*:

Name *(printed)*:

Title:

Accepted by Owner:

By *(signature)*:

Name *(printed)*:

Title:

NOTICE OF ACCEPTABILITY OF WORK

Owner: _____ Owner's Project No.: _____
Engineer: _____ Engineer's Project No.: _____
Contractor: _____ Contractor's Project No.: _____
Project: _____
Notice Date: _____ Effective Date of the Construction Contract: _____

The Engineer hereby gives notice to the Owner and Contractor that Engineer recommends final payment to Contractor, and that the Work furnished and performed by Contractor under the Construction Contract is acceptable, expressly subject to the provisions of the Construction Contract's Contract Documents ("Contract Documents") and of the Agreement between Owner and Engineer for Professional Services dated _____ ("Owner-Engineer Agreement"). This Notice of Acceptability of Work (Notice) is made expressly subject to the following terms and conditions to which all who receive and rely on said Notice agree:

1. This Notice has been prepared with the skill and care ordinarily used by members of the engineering profession practicing under similar conditions at the same time and in the same locality.
2. This Notice reflects and is an expression of the Engineer's professional opinion.
3. This Notice has been prepared to the best of Engineer's knowledge, information, and belief as of the Notice Date.
4. This Notice is based entirely on and expressly limited by the scope of services Engineer has been employed by Owner to perform or furnish during construction of the Project (including observation of the Contractor's Work) under the Owner-Engineer Agreement, and applies only to facts that are within Engineer's knowledge or could reasonably have been ascertained by Engineer as a result of carrying out the responsibilities specifically assigned to Engineer under such Owner-Engineer Agreement.
5. This Notice is not a guarantee or warranty of Contractor's performance under the Construction Contract, an acceptance of Work that is not in accordance with the Contract Documents, including but not limited to defective Work discovered after final inspection, nor an assumption of responsibility for any failure of Contractor to furnish and perform the Work thereunder in accordance with the Contract Documents, or to otherwise comply with the Contract Documents or the terms of any special guarantees specified therein.
6. This Notice does not relieve Contractor of any surviving obligations under the Construction Contract, and is subject to Owner's reservations of rights with respect to completion and final payment.

Engineer

By (*signature*): _____
Name (*printed*): _____
Title: _____

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Meyer & Associates, Inc.
Consulting Engineers

Project:			Pay Application No.:	
Owner:			From:	To:
Contractor:			Project No.:	
Original Contract Amount:		Adjusted Contract Amount:	Approved Change Orders:	

	This Period	Total to Date
Total Value of Work Completed:	\$0.00	\$0.00
Retainage: 10%	\$0.00	\$0.00
Materials On Hand:	\$0.00	\$0.00
Deductions:	\$0.00	\$0.00
Net Earned to Date:	\$0.00	\$0.00
Less Amount Paid to Date:		
Net Amount Due This Application:	\$0.00	\$0.00

The undersigned CONTRACTOR certifies that (1) all previous progress payments received from OWNER on account of Work done under the Contract referred to above have been applied to discharge in full all obligations of CONTRACTOR incurred in connection with Work covered by all prior Applications for Payment inclusive; and (2) Title to all 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, claims, security interests and encumbrances (except such as covered by Bond acceptable to OWNER). (3) Partial pay amounts and associated quantities, cash allowances and stated allowance work are subject to reconciliation by Engineer in accordance with controlling provisions of the contract. (4) Approval of interim payment application does not in anyway constitute approval of time (days) and schedule.

Certified Correct for Payment Contractor		Recommended for Payment Meyer & Associates, Inc. Engineer		Approved for Payment Owner	
By:		By:		By:	
Date:		Date:		Date:	

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Pay Application No. _____		for Period _____		to _____				
1. COST OF WORK COMPLETED TO DATE UNDER ORIGINAL CONTRACT ONLY Entries must be limited to work and costs under the original contract only. Columns (1) through (5). Enter data from Bid Form. Columns (6) and (7). Show all work completed this period under original contract. Columns (8) and (9). Show all work completed to date under original contract.								
		Contract Amount			Completed This Period		Completed To Date	
Item No. (1)	Description of Items (2)	Quantity (3)	Cost per Unit (4)	Total Cost Per Unit (5)	Quantity or % (6)	Total Cost (7)	Quantity or % (8)	Total Cost (9)
				\$0.00		\$0.00		\$0.00
				\$0.00		\$0.00		\$0.00
				\$0.00		\$0.00		\$0.00
				\$0.00		\$0.00		\$0.00
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Pay Application No. 0 for Period 1/0/00 to 1/0/00											
2. INSTRUCTIONS FOR MATERIAL INVENTORY											
Entries must be limited to materials and costs under the original contract only.											
Column (3): Price of materials per invoices. Column (4): Quantity received this month with corresponding invoices attached.											
Column (5): Cumulative quantity received. Column (6): Column 3 x 4. Column (7): Column 3 x 5. Column (8): Quantity used in current month.											
Column (9): Cumulative quantity used. Column (10): Column 3 x 8. Column (11): Column 3 x 9. Column (12): Column 7 - 11.											
Item No. (1)	Description of Items (2)	Material Unit Price (3)	Received Current (Quantity) (4)	Received Total (Quantity) (5)	Received Current (Value) (6)	Received Total (Value) (7)	Used Current (Quantity) (8)	Used Total (Quantity) (9)	Used Current (Value) (10)	Used Total (Value) (11)	Current In- Stock (Value) (12)
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GENERAL CONDITIONS

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared By



Endorsed By



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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The document prepared by Contractor, in a form acceptable to Engineer, to request progress or final payments, and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The Advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*
 - a. A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment of Contract Price or Contract Times; contesting an initial decision by Engineer concerning the

requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.

- b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.
 - c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.
 - d. A demand for money or services by a third party is not a Claim.
- 11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
 - 12. *Contract*—The entire and integrated written contract between Owner and Contractor concerning the Work.
 - 13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
 - 14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.
 - 15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
 - 16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
 - 17. *Cost of the Work*—See Paragraph 13.01 for definition.
 - 18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
 - 19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
 - 20. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.
 - 21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the

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

22. *Engineer*—The individual or entity named as such in the Agreement.
23. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.
 - a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.
 - b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.
 - c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.
25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.
28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
29. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
31. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising Contractor's plan to accomplish the Work within the Contract Times.
32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.
34. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals.
36. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.
37. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.
38. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands or areas furnished by Owner which are designated for the use of Contractor.
39. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
40. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers’ instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.
42. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion of such Work.

43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.
44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
45. *Supplier*—A manufacturer, fabricator, supplier, distributor, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
46. *Technical Data*
- a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.
 - b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.
 - c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.
47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.
48. *Unit Price Work*—Work to be paid for on the basis of unit prices.
49. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.
50. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 Terminology

- A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:* The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. *Day:* The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:* The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - 1. does not conform to the Contract Documents;
 - 2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - 3. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or Paragraph 15.04).
- E. *Furnish, Install, Perform, Provide*
 - 1. The word “furnish,” when used in connection with services, materials, or equipment, means to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 - 2. The word “install,” when used in connection with services, materials, or equipment, means to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 - 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, means to furnish and install said services, materials, or equipment complete and ready for intended use.
 - 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

- F. *Contract Price or Contract Times*: References to a change in “Contract Price or Contract Times” or “Contract Times or Contract Price” or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term “or both” is not expressed.
- G. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Performance and Payment Bonds; Evidence of Insurance*

- A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.
- C. *Evidence of Owner’s Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work

into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work, and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable schedules are submitted to Engineer.
 - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 - 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 - 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.
 - 4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.
- B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.
- F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.
- G. Nothing in the Contract Documents creates:
 - 1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or
 - 2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 *Reference Standards*

- A. *Standards Specifications, Codes, Laws and Regulations*
 - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, means the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 - 2. No provision of any such standard specification, manual, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner or Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility

inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.
2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

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

- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein precludes Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

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

4.02 *Starting the Work*

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

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the

established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times must be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
 - 1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 - 2. Abnormal weather conditions;
 - 3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and
 - 4. Acts of war or terrorism.

- D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:
1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.
 2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.
 3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.
- E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:
1. The circumstances that form the basis for the requested adjustment;
 2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;
 3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;
 4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and
 5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.
- Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.
- F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.
- G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

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

5.01 *Availability of Lands*

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

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

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

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris will conform to applicable Laws and Regulations.
 - C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment

and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

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

5.03 *Subsurface and Physical Conditions*

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

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

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

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

- D. *Limitations of Other Data and Documents:* Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;
 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;
 3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or
 4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate;
 2. is of such a nature as to require a change in the Drawings or Specifications;
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

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

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- E. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in

Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,
 - c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise;
 - b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice required by Paragraph 5.04.A.
 3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
 4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.
- F. *Underground Facilities; Hazardous Environmental Conditions:* Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:
1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 2. complying with applicable state and local utility damage prevention Laws and Regulations;

3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;
 4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing regarding such Underground Facility.
- C. *Engineer's Review:* Engineer will:
1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;
 2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;
 3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and
 4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- F. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown

or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and
 - c. Contractor gave the notice required in Paragraph 5.05.B.
2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.
 4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 *Hazardous Environmental Conditions at Site*

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

1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;
2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
3. Technical Data contained in such reports and drawings.

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

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures

- of construction to be employed by Contractor, and safety precautions and programs incident thereto;
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.
- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.
- H. If, after receipt of such written notice, Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special

conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court, arbitration, or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I obligates Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J obligates Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.
- B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.
- C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or

Regulations, and must be issued and signed by a surety named in “Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies” as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual’s authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

- D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.
- E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.
- F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner’s termination rights under Article 16.
- G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.
- H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Alternative forms of insurance coverage, including but not limited to self-insurance and “Occupational Accident and Excess Employer’s Indemnity Policies,” are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.
- D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by

Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.

- E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.
- F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.
- H. Contractor shall require:
 - 1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and
 - 2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.
- I. If either party does not purchase or maintain the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
- J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.
- K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.

- L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.
- M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.
- N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 *Contractor's Insurance*

- A. *Required Insurance:* Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.
- B. *General Provisions:* The policies of insurance required by this Paragraph 6.03 as supplemented must:
 - 1. include at least the specific coverages required;
 - 2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;
 - 3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;
 - 4. apply with respect to the performance of the Work, whether such performance is by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable; and
 - 5. include all necessary endorsements to support the stated requirements.
- C. *Additional Insureds:* The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:
 - 1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;
 - 2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;
 - 3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);

4. not seek contribution from insurance maintained by the additional insured; and
5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 *Builder's Risk and Other Property Insurance*

- A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.
- B. *Property Insurance for Facilities of Owner Where Work Will Occur*: Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.
- C. *Property Insurance for Substantially Complete Facilities*: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.
- D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.
- E. *Insurance of Other Property; Additional Insurance*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 *Property Losses; Subrogation*

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

Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.

1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.
 2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.
1. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.
- C. The waivers in this Paragraph 6.05 include the waiver of rights due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other insured peril, risk, or cause of loss.
- D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

- A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and neither Owner nor Engineer has any responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

7.02 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.03 *Labor; Working Hours*

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

- B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.
- C. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment must be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.05 *"Or Equals"*

- A. *Contractor's Request; Governing Criteria:* Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that the proposed item:
 - 1) is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

- 2) will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) has a proven record of performance and availability of responsive service; and
 - 4) is not objectionable to Owner.
- b. Contractor certifies that, if the proposed item is approved and incorporated into the Work:
- 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) the item will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense*: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.
- D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. The Engineer's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.
- E. *Treatment as a Substitution Request*: If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 Substitutes

- A. *Contractor's Request; Governing Criteria*: Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.
1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.
 2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

3. Contractor shall make written application to Engineer for review of a proposed substitute item of equipment or material that Contractor seeks to furnish or use. The application:
 - a. will certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design;
 - 2) be similar in substance to the item specified; and
 - 3) be suited to the same use as the item specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from the item specified; and
 - 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee*: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

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

7.07 *Concerning Subcontractors and Suppliers*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.
- B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.
- E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.
- F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

- H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.
- J. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.
- K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.
- L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.
- M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If an invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights will be disclosed in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.09 *Permits*

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

7.10 *Taxes*

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

7.11 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.
- C. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.12 *Record Documents*

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

7.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations.
- B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.
- C. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- E. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.
- F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
- G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.
- H. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

- I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).
- J. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.14 *Hazard Communication Programs*

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

7.15 *Emergencies*

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

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

- 1. Before submitting a Shop Drawing or Sample, Contractor shall:
 - a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determine and verify:
 - 1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;
 - 2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - 3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;
 - c. confirm that the Submittal is complete with respect to all related data included in the Submittal.
- 2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.

3. With each Shop Drawing or Sample, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.
- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.
1. *Shop Drawings*
 - a. Contractor shall submit the number of copies required in the Specifications.
 - b. Data shown on the Shop Drawings must be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide, and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.C.
 2. *Samples*
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the Submittal for the limited purposes required by Paragraph 7.16.C.
 3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Engineer's Review of Shop Drawings and Samples*
1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. Engineer's review and approval will be only to determine if the items covered by the Submittals will, after installation or incorporation in the Work, comply with the requirements of the Contract Documents, and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction, or to safety precautions or programs incident thereto.
 3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
 4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will

document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.
8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.

D. Resubmittal Procedures for Shop Drawings and Samples

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous Submittals.
2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

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

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:
 - a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.
 - b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.
 - c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.

- d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.
- 2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03, 2.04, and 2.05.
- F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 Contractor's General Warranty and Guarantee

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer is entitled to rely on Contractor's warranty and guarantee.
- B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:
 - 1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and
 - 2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.
- C. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - 1. abuse, or improper modification, maintenance, or operation, by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 - 2. normal wear and tear under normal usage.
- D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:
 - 1. Observations by Engineer;
 - 2. Recommendation by Engineer or payment by Owner of any progress or final payment;
 - 3. The issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 - 4. Use or occupancy of the Work or any part thereof by Owner;
 - 5. Any review and approval of a Shop Drawing or Sample submittal;
 - 6. The issuance of a notice of acceptability by Engineer;
 - 7. The end of the correction period established in Paragraph 15.08;
 - 8. Any inspection, test, or approval by others; or

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

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from losses, damages, costs, and judgments (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A will not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

7.19 *Delegation of Professional Design Services*

- A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.
- B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.
- C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.

- D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.
- E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:
 - 1. Checking for conformance with the requirements of this Paragraph 7.19;
 - 2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and
 - 3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.
- F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.
- G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.
- D. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

- E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.
- F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. The identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. An itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. The extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

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

- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.
 - 1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.
 - 2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.
- C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

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

9.03 *Furnish Data*

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

9.04 *Pay When Due*

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

- 9.05 *Lands and Easements; Reports, Tests, and Drawings*
- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
 - B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
 - C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.
- 9.06 *Insurance*
- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.
- 9.07 *Change Orders*
- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.
- 9.08 *Inspections, Tests, and Approvals*
- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.
- 9.09 *Limitations on Owner's Responsibilities*
- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- 9.10 *Undisclosed Hazardous Environmental Condition*
- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.
- 9.11 *Evidence of Financial Arrangements*
- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract (including obligations under proposed changes in the Work).
- 9.12 *Safety Programs*
- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
 - B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

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

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe, as an experienced and qualified design professional, the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.07. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Resident Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.
- B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

10.04 *Engineer's Authority*

- A. Engineer has the authority to reject Work in accordance with Article 14.
- B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.
- C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.
- D. Engineer's authority as to changes in the Work is set forth in Article 11.

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

10.05 *Determinations for Unit Price Work*

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

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

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

10.07 *Limitations on Engineer's Authority and Responsibilities*

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

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

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

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

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

10.08 *Compliance with Safety Program*

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

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

- A. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
- B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.
- C. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 *Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
 - 1. Changes in Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 - 2. Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 - 3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and
 - 4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Work Change Directives*

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

- B. If Owner has issued a Work Change Directive and:
 - 1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.
 - 2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 *Field Orders*

- A. Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.
- B. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.05 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.
- B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.
- C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 *Unauthorized Changes in the Work*

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

11.07 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:

1. Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);
 2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or
 3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).
- C. *Contractor's Fee:* When applicable, the Contractor's fee for overhead and profit will be determined as follows:
1. A mutually acceptable fixed fee; or
 2. If a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. For costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;
 - b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 percent;
 - c. Where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;
 - d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
 - e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and
 - f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

11.08 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.
- B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

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

- B. *Change Proposal Procedures*

- 1. *Submittal:* Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.
- 2. *Supporting Data:* The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.
 - a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.
 - b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

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

- 3. *Engineer's Initial Review:* Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.
- 4. *Engineer's Full Review and Action on the Change Proposal:* Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change

Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

5. *Binding Decision*: Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- C. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.
- D. *Post-Completion*: Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 *Notification to Surety*

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

ARTICLE 12—CLAIMS

12.01 *Claims*

- A. *Claims Process*: The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:
 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;
 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and
 4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.
- B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge

and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

- C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process will resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process will resume as of the date of the conclusion of the mediation, as determined by the mediator.
 - 3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

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

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
 - 1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included:* Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will be included in the above to the extent authorized by Owner.
 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will accrue to Owner, and Contractor shall make provisions so that they may be obtained.
 3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, which will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
 4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed or retained for services specifically related to the Work.
 5. Other costs consisting of the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, which are

consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

- 1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.

c. *Construction Equipment Rental*

- 1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.
 - 2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.
 - 3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.
- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
- e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Paragraph 6.04), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
 - h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
 - i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.
- C. *Costs Excluded:* The term Cost of the Work does not include any of the following items:
- 1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
 - 2. The cost of purchasing, renting, or furnishing small tools and hand tools.
 - 3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
 - 4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
 - 5. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
 - 6. Expenses incurred in preparing and advancing Claims.
 - 7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.
- D. *Contractor's Fee*
- 1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:
 - a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.
 - b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:
 - 1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.
 - 2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.
 - 2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change

Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

- E. *Documentation and Audit*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

13.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances*: Contractor agrees that:
1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment for any of the foregoing will be valid.
- C. *Owner's Contingency Allowance*: Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor for Work covered by allowances, and the Contract Price will be correspondingly adjusted.

13.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision

thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:
 - a. the quantity of the item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 - b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.
2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.
3. Adjusted unit prices will apply to all units of that item.

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

14.01 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply with such procedures and programs as applicable.

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 3. by manufacturers of equipment furnished under the Contract Documents;
 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests will be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering will be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt written notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs,

losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work will be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.
- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
 - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 - 2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work,

or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work will not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 Owner May Correct Defective Work

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15—PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 Progress Payments

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments*
 - 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.
 - 2. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation

establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. Review of Applications

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work;
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
 - e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

- b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. The Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. The Contract Price has been reduced by Change Orders;
 - i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;
 - j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens; or
 - l. Other items entitle Owner to a set-off against the amount recommended.
2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.
 3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time

submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.
- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without

significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.
2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.
2. The final Application for Payment must be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

- d. a list of all duly pending Change Proposals and Claims; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
- 3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.
- B. *Engineer's Review of Final Application and Recommendation of Payment:* If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.
- C. *Notice of Acceptability:* In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.
- D. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of notice of the acceptability of the Work.
- E. *Final Payment Becomes Due:* Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

- A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim,

appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a Claim, or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such adjacent areas;
 - 2. correct such defective Work;
 - 3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.
- B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.
- C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.
- D. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

- F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times directly attributable to any such suspension. Any Change Proposal seeking such adjustments must be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the Progress Schedule);
 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:
1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and
 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects,

attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

- A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 days' written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, 7 days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The

provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this article:
 - 1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and
 - 2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this article, Owner or Contractor may:
 - 1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;
 - 2. agree with the other party to submit the dispute to another dispute resolution process; or
 - 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:
 - 1. in person, by a commercial courier service or otherwise, to the recipient's place of business;
 - 2. by registered or certified mail, postage prepaid, to the recipient's place of business; or
 - 3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision will not constitute a waiver of that provision, nor will it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

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

18.07 *Controlling Law*

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

18.08 *Assignment of Contract*

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

18.09 *Successors and Assigns*

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

18.10 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SUPPLEMENTARY CONDITIONS

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SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared By



Endorsed By



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SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

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SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

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

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

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

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

SC-1.01 Delete Paragraph 3 in its entirety and insert the following in its place:

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

SC-1.01 Add the following new subparagraphs immediately after Paragraph 1.01.A.50:

51. *Funding Agency*—The Funding Agency for the Project is the State of Louisiana Facility Planning and Control.

ARTICLE 2—PRELIMINARY MATTERS

2.02 *Copies of Documents*

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

- A. Owner shall furnish to Contractor one fully signed counterpart of the Agreement and one USB drive containing PDF files of conformed Contract Documents incorporating and integrating all Addenda and any amendments negotiated prior to the Effective Date of the Contract. Printed copies of the conformed Contract Documents will be furnished upon request at the cost of reproduction.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

SC-3.01 Add the following new paragraphs immediately after Paragraph 5.01.G:

- H. The Drawings do not purport to show all the details of the Work. The Drawings, Specifications and Contract Documents are intended to describe a functionally complete project, any work that may reasonably be inferred as being required to produce the intended result is to be supplied by the Contractor even though not specifically called for in the Contract Documents (either the Drawings or Specifications).

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

SC-4.01 Delete Paragraph 4.01.A in its entirety and insert the following in its place:

- A. The Contract Times will commence to run on the day indicated in the Notice to Proceed. The Notice to Proceed will be given within 30 days after the Effective Date of the Contract unless the Owner and Contractor, upon mutual consent, agree to extend the deadline to issue the Notice to Proceed.

4.05 *Delays in Contractor's Progress*

SC-4.05 Amend Paragraph 4.05.C by adding the following subparagraphs:

2. *Abnormal weather conditions;*

- a. The existence of abnormal weather conditions will be determined on a month-by-month basis in accordance with the following:

- 1) Every workday on which total precipitation occurring between 7:00 p.m. on the preceding day (regardless of whether such preceding day is a workday) through 7:00 p.m. on the workday in question equals or exceeds 0.25" of precipitation will be considered a "bad weather day", and
- 2) Every workday on which site conditions are still too wet as a result of rain on preceding days. Such "mud" days must be thoroughly documented by the Contractor and approved by the Resident Project Representative.
- 3) Contractor shall anticipate the following number of foreseeable bad weather days per month:

January 11	May 5	September 4
February 10	June 6	October 3
March 8	July 6	November 5
April 7	August 5	December 8

- 4) In each month, every bad weather day exceeding the number of foreseeable bad weather days established in the preceding list will be considered as "abnormal weather conditions." The existence of abnormal weather conditions will not relieve Contractor of the obligation to demonstrate and document that delays caused by abnormal weather are specific to the planned work activities or that such activities thus delayed were on Contractor's then-current Progress Schedule's critical path for the Project.

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

5.01 *Availability of Lands*

SC-5.01 Add the following new paragraphs immediately after Paragraph 5.01.C:

- D. The Contractor shall be responsible for coordinating his construction activities through the Owner and Engineer to ensure that all improvements are placed in the proper location. Permanent improvements on private property are limited to those areas having an executed easement agreement prior to installation. Contractor is to comply with all terms, restrictions, special conditions, etc., as described in the easements. Costs of such compliance is to be reflected in related work. No separate compensation will be made for this compliance.

5.03 *Subsurface and Physical Conditions*

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

- E. The following table lists the reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data, and specifically identifies the Technical Data in the report upon which Contractor may rely:

Report Title	Date of Report	Technical Data
Geotechnical Engineering Report, Lacassine Water Treatment Plant	January 23, 2025	Boring logs, water levels, laboratory results.

- F. The following table lists the drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data, and specifically identifies the Technical Data upon which Contractor may rely:

Drawings Title	Date of Drawings	Technical Data
None	N/A	N/A

- G. Copies of reports and drawings identified in SC-5.03.E and SC-5.03.F are provided in Exhibit SC 5.03.

5.05 *Underground Facilities*

SC-5.05 Delete subparagraph 5.05.A.3 in its entirety and insert the following in its place:

3. verifying the actual location of those Underground Facilities shown or not shown, indicated or not indicated, in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;

SC-5.05 Delete Paragraph 5.05B in its entirety and insert the following in its place:

- B. *Notice by Contractor:* If Contractor encounters what he believes to be an unforeseen conflict with an Underground Facility, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in

connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing regarding such Underground Facility. An Underground Facility may be considered an unforeseen conflict only if all of the following provisions apply:

1. Underground Facility was not shown or indicated on the Drawings.
2. Underground Facility was not shown or indicated on the Drawings with reasonable accuracy.
3. Presence of Underground Facility was not visually apparent based on aboveground indicators such as signage, markers, piping, meters, pedestals, etc. as could reasonably expect to be seen during Contractor's pre-bid site visit.

SC-5.05 Delete Paragraph 5.05C.1 in its entirety and insert the following in its place:

4. Promptly review the Underground Facility and conclude whether such Underground Facility meets the criteria of an unforeseen conflict as described in SC5.05A.

SC-5.05 Delete Paragraph 5.05F in its entirety and insert the following in its place:

1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site meets the criteria of an unforeseen conflict, and any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and
 - c. Contractor gave the notice required in Paragraph 5.05.B.
2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions*

SC-5.06 Add the following new paragraphs immediately after Paragraph 5.06.A.3:

4. The following table lists the reports known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and the Technical Data (if any) upon which Contractor may rely:

Report Title	Date of Report	Technical Data
None	N/A	N/A

5. The following table lists the drawings known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and Technical Data (if any) contained in such Drawings upon which Contractor may rely:

Drawings Title	Date of Drawings	Technical Data
None	N/A	N/A

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

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

- I. In exercising any of the provisions of the Contract Documents, neither the Owner nor the Engineer shall be responsible for notifying the surety. It shall be the Contractor's responsibility to notify the surety of changes or assignments and progress of the Work. Nothing in these documents shall in any way indicate or incur a responsibility of the Owner or Engineer to safeguard the surety's financial interest relative to the Work.

6.02 *Insurance – General Provisions*

SC-6.02 Add the following new paragraphs immediately after Paragraph 6.02.N:

- O. The following must appear verbatim in the Insurance Certificate: "Blanket additional insureds and blanket waiver of subrogation as required by contract."

6.03 *Contractor's Insurance*

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

- D. *Workers' Compensation and Employer's Liability:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance, including, as applicable, United States Longshoreman and Harbor Workers' Compensation Act, and foreign voluntary workers' compensation (from available sources, notwithstanding the jurisdictional requirement of Paragraph 6.02.B of the General Conditions).

Workers' Compensation and Related Policies	Policy limits of not less than:
Workers' Compensation	
State	Statutory
Applicable Federal (e.g., Longshoreman's)	Statutory
Employer's Liability	
Each accident	\$1,000,000
Each employee	\$1,000,000
Policy limit	\$1,000,000

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

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

6. Any limitation or exclusion based on the nature of Contractor's work.
7. Any professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.

H. *Commercial General Liability—Minimum Policy Limits*

Commercial General Liability	Policy limits of not less than:
General Aggregate	\$2,000,000
Products—Completed Operations Aggregate	\$1,000,000
Personal and Advertising Injury	\$1,000,000
Bodily Injury and Property Damage—Each Occurrence	\$1,000,000

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

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

- J. *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. The coverage afforded must be at least as broad as that of each and every one of the underlying policies.

Excess or Umbrella Liability	Policy limits of not less than:
Each Occurrence	\$2,000,000
General Aggregate	\$2,000,000

- K. *Using Umbrella or Excess Liability Insurance to Meet CGL and Other Policy Limit Requirements:* Contractor may meet the policy limits specified for employer's liability, commercial general liability, and automobile liability through the primary policies alone, or through combinations of the primary insurance policy's policy limits and partial attribution of the policy limits of an umbrella or excess liability policy that is at least as broad in coverage as that of the underlying policy, as specified herein. If such umbrella or excess liability policy was required under this Contract, at a specified minimum policy limit, such umbrella or excess policy must retain a minimum limit of \$2,000,000 after accounting for partial attribution of its limits to underlying policies, as allowed above.
- L. *Contractor's Pollution Liability Insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage, including cleanup costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance must be maintained for no less than three years after final completion.

Contractor's Pollution Liability	Policy limits of not less than:
Each Occurrence/Claim	Not Required
General Aggregate	Not Required

6.04 Builder's Risk and Other Property Insurance

SC-6.04 Delete Paragraph 6.04.B and insert the following in its place:

- B. *Property Insurance for Facilities of Owner Where Work Will Occur:* Owner will maintain property insurance covering its existing structures, buildings, or facilities, but Owner will not be responsible for obtaining and maintaining property insurance written on a special perils (all-risk) form. As a result, it is recommended that Contractor purchase and maintain property insurance in the form of a builder's risk "all risk" policy form on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D, for each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined.

SC-6.04 Supplement Paragraph 6.04 of the General Conditions with the following provisions:

- F. *Builder's Risk Requirements:* The builder's risk insurance must:
1. be written on a builder's risk "all risk" policy form that at a minimum includes insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment stored and in transit, and must not exclude the coverage of the following risks: fire; windstorm; hail; flood; earthquake, volcanic activity, and other earth movement; lightning; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; and water damage (other than that caused by flood).
 - a. Such policy will include an exception that results in coverage for ensuing losses from physical damage or loss with respect to any defective workmanship, methods, design, or materials exclusions.
 - b. 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 will be provided through other insurance policies acceptable to Owner and Contractor.
 2. 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.

3. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of contractors, engineers, and architects).
4. 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).
5. extend to cover damage or loss to insured property while in transit.
6. allow for the waiver of the insurer's subrogation rights, as set forth in this Contract.
7. allow for partial occupancy or use by Owner by endorsement, and without cancellation or lapse of coverage.
8. include performance/hot testing and start-up, if applicable.
9. be maintained in effect until the Work is complete, as set forth in Paragraph 15.06.D of the General Conditions, or until written confirmation of Owner's procurement of property insurance following Substantial Completion, whichever occurs first.
10. include as named insureds the Owner, Contractor, Subcontractors (of every tier), and any other individuals or entities required by this Contract to be insured under such builder's risk policy. For purposes of Paragraphs 6.04, 6.05, and 6.06 of the General Conditions, and this and all other corresponding Supplementary Conditions, the parties required to be insured will be referred to collectively as "insureds."
11. include, in addition to the Contract Price amount, the value of the following equipment and materials to be installed by the Contractor but furnished by the Owner or third parties:
 - a. None

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.03 *Labor; Working Hours*

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

1. Regular working hours will be 6 AM - 7 PM.
2. Contractor's requests for working outside of regular hours and/or on a Saturday, Sunday, or legal holiday shall be made at least 48 hours in advance.

7.04 *Services, Materials, and Equipment*

SC-7.04 Add a new paragraph immediately after Paragraph 7.04.C:

- D. Suppliers of all materials or equipment furnished shall supply manufacturer's printed warranties on all materials or equipment furnished. Duration of warranties shall be as specified in the appropriate section of the Specifications. The Contractor shall furnish these warranties with the shop drawings and record documents. Limitations contained in the warranties from suppliers or manufacturers shall in no way limit or reduce the Contractor's obligations during the specified correction period.

7.07 *Concerning Subcontractors and Suppliers*

SC-7.07 Add a new paragraph immediately after Paragraph 7.07.M:

- N. The Contractor shall not award work valued at more than 50% of the Contract Price to a single Subcontractor without prior written approval of the Owner.

7.10 *Taxes*

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

- B. Owner is exempt from payment of sales and compensating use taxes of the State of Louisiana and of cities and parishes thereof on all materials to be incorporated into the Work. In accordance with LA R.S. 47:305.7(A), the Contractor and subcontractors shall each complete and submit a Form R-85012, *Public Projects Contractor/Subcontractor Certification and Exemption Application*, electronically to obtain a Form R-85014, *Public Projects Contractor/Subcontractor Certification and Sales Tax Exemption Certificate*. This certificate shall relieve the Contractor and subcontractors (1) from paying any state or local sales or state or local use taxes on materials, supplies or equipment which is affixed to and/or made a part of the real estate of the Project or Work or which is permanently incorporated into the Project or Work and, (2) from paying any state or local use taxes on any materials, supplies or equipment which is leased and used exclusively for the Project or Work. Accordingly, in preparing their bids and computing costs, the Contractor and subcontractors shall not consider sales and/or use taxes which would otherwise be due.

7.18 *Indemnification*

SC-7.18 Add a new paragraph immediately after Paragraph 7.18.B:

- C. If through the acts of neglect on the part of Contractor, any other contractor or any Subcontractor shall suffer loss or damage on the Work, Contractor shall settle with such other contractor or Subcontractor by agreement or arbitration if such other contractor or Subcontractor will so settle. If such other contractor or Subcontractor shall assert any claim against Owner and/or Engineer, or the officers, directors, members, partners, employees, agents, consultants, and Subcontractors of each on account of any damage alleged to have been sustained, Contractor shall indemnify and save harmless Owner, Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each against any such claims.

ARTICLE 8—OTHER WORK AT THE SITE

There are no Supplementary Conditions in this Article.

ARTICLE 9—OWNER’S RESPONSIBILITIES

There are no Supplementary Conditions in this Article.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.03 *Resident Project Representative*

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

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

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

ARTICLE 11—CHANGES TO THE CONTRACT

11.09 *Change Proposals*

SC-11.09 Supplement Paragraph 11.09.B.2.b by adding the following sentence:

Proposal must include a detailed, itemized list of labor, material, and equipment costs for the Contractor's work including quantities and unit costs for each item of labor, material, and equipment. Similar itemized breakdowns shall be provided for all Subcontractor work.

ARTICLE 12—CLAIMS

There are no Supplementary Conditions in this Article.

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

13.01 *Cost of the Work*

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

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

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

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

13.03 *Unit Price Work*

SC-13.03 Delete Paragraph 13.03.E in its entirety and insert the following in its place:

E. *Adjustments in Unit Price*

1. In accordance with R.S. 2212.M(5), where unit prices are contained in the initial Contract, no deviations shall be allowed in computing negotiated Change Order costs.

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

14.02 *Tests, Inspections, and Approvals*

SC-14.02 Add new paragraphs immediately after Paragraph 14.02.F:

- G. Contractor shall provide at no cost to the Owner any required specimens for testing purposes.
- H. Contractor is responsible for all costs for follow-up testing required as a result of failed tests.

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

15.01 *Progress Payments*

SC-15.01 Add the following new subparagraphs following subparagraph 15.01.B.4:

5. Applications for Payment must be executed by an authorized representative of the Contractor. An applicable document shall accompany the first Application for Payment that provides evidence of authorization to sign such as a corporate resolution for a corporation.
6. To ensure that processing milestones are complied with, the following schedule applies:
 - a. Work included for payment shall consist of work performed prior to the monthly cutoff date. The cutoff date shall be established at the preconstruction conference in a manner to be consistent with the Owner’s meeting schedule.
 - b. Contractor shall review monthly quantities and work performed with the Resident Project Representative and confirm agreement on said quantities and work performed prior to submitting the Application for Payment.
 - c. Contractor shall submit the Application for Payment to the Engineer not later than 5 days following the cutoff date.

SC-15.01 Delete Paragraph 15.01D of the General Conditions and substitute the following in its place:

D. Payment Becomes Due

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 15.01.E) be requested from the Funding Agency by the Owner. Within ten days of the Owner receiving the funding from the Funding Agency, the amount recommended will become due, and when due will be paid by Owner to Contractor.

15.03 Substantial Completion

SC-15.03 Add the following new subparagraphs to Paragraph 15.03.C:

1. Any punch list generated during the Project will include the cost estimates for each item based on the mobilization, labor, material, and equipment costs of correcting each punch list item.
2. Contractor is responsible for recording the certificate of Substantial Completion at the Clerk of Court in the parish where the Work is located.

15.06 Final Payment

SC-15.06 Add the following new subparagraph following subparagraph 15.06.A.2.e:

- f. A certified clear lien certificate on the Contract obtained from the Clerk of Court at least 45 days after the recordation date of the certificate of Substantial Completion.

SC-15.06 Delete Paragraph 15.06E of the General Conditions and substitute the following in its place:

E. Final Payment Becomes Due

1. Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the Owner shall request the resulting balance due to Contractor from the Funding Agency. Within ten days of the Owner receiving the funding from the Funding Agency, the amount recommended will become due, and when due will be paid by Owner to Contractor.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.04 Contractor May Stop Work or Terminate

SC-16.04 Delete Paragraph 16.04B of the General Conditions and substitute the following in its place:

- 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 45 days to pay Contractor any sum finally determined to be due, Contractor may, 7 days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a

Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17—FINAL RESOLUTIONS OF DISPUTES

17.02 Attorneys' Fees

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

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

ARTICLE 18—MISCELLANEOUS

18.01 Giving Notice

SC-18.01 Delete Paragraph 18.01.A and insert the following in its place:

- A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered by one of the following means and copied and delivered in a similar manner to the Engineer:
 - 1. in person, by a commercial courier service or otherwise, to the recipient's place of business;
 - 2. by registered or certified mail, postage prepaid, to the recipient's place of business; or
 - 3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

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EXHIBIT SC – 5.03
GEOTECHNICAL REPORT

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Geotechnical Engineering Report

**Lacassine Water Treatment Plant
LA Highway 101
Lacassine, Louisiana**

for

**Meyer & Associates, Inc.
600 Cities Service Highway
Sulphur, LA 70663**

prepared by

**Daniel J. Holder, P.E., Inc.
Consulting Civil / Geotechnical Engineer
2767 Scarborough Drive
Lake Charles, LA 70615**

**DJH File 24-045
23 January 2025**

Daniel J. Holder, P.E., Inc.
Consulting Geotechnical Engineer

2767 Scarborough Drive
Lake Charles, LA 70615
dan@danholderpe.com
337-274-4125

23 January 2025

Meyer & Associates, Inc.
600 Cities Service Highway
Sulphur, LA 70663

Attn: Mr. Mark McCarty, P.E.

RE: Geotechnical Engineering Report
Lacassine Water Treatment Plant
LA Highway 101
Lacassine, Louisiana
DJH File 24-045

Dear Mr. McCarty:

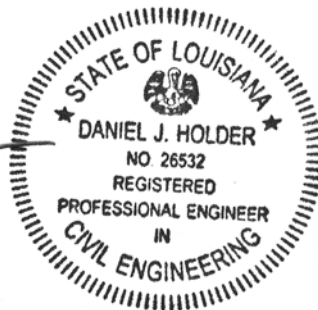
We have completed the Geotechnical Engineering Report for the referenced project, and are submitting the same herewith. This work was performed in general accordance with our written scope of work dated 26 September 2024, which was authorized by your e-mail to this office dated 18 November 2024.

Please advise if you have any questions regarding this information, or if I may be of any additional assistance. It has been a pleasure working with you on this project.

Sincerely,



Daniel J. Holder, P.E.
Louisiana P.E. Reg. No. 26532



Report Distribution:

1 electronic file (.PDF)

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APPENDIX

Geotechnical Engineering Report

Lacassine Water Treatment Plant LA Highway 101 Lacassine, Louisiana

DJH File 24-045; 23 January 2025

PROJECT INFORMATION

1. Description of Project. According to the information provided, it is understood that this project will include a new, 300,000 gallon, bolted steel ground storage tank approximately 39 feet in diameter by 33 feet tall; a 40 by 60 foot (in plan) filter building; a 30 by 50 foot (in plan) pump and electrical building; light, miscellaneous equipment pads; a new aggregate drive; and a 17,500 square foot (in plan, at the top) retention pond. Another, similar ground storage tank is planned for the future. It is anticipated that the new tank(s) will be supported by a concrete ringwall type foundation; that the new buildings will be pre-engineered metal buildings with 16 foot eave heights and shallow foundations; and that the filter units will be "bullet" type vessels supported by continuous shallow "saddle" type foundations. It is further expected that the equipment pads will be shallow concrete slabs-on-grade; and that the aggregate drive will be subject to occasional maintenance truck and light passenger vehicle traffic.

The new Water Treatment Plant will be located on the west side of LA Highway 101, about three quarters of a mile south of Interstate 10, in Lacassine, Louisiana. Refer to the Site Vicinity Map (Figure 1), the Aerial Photograph / Boring Location Plan (Figure 2), and the Site Plan / Boring Location Plan (Figure 3) in the Appendix.

RESULTS OF INVESTIGATION

2. General. This investigation included the following work activities.

- a review of available geologic information;
- a site reconnaissance by the project engineer;
- nine (9) soil borings, including one (1) to the 50 foot depth at the center of the new tank, one (1) to the 25 foot depth at the center of the future tank, two (2) to the 15 foot depth at the building locations, three (3) to the 4 foot depth for the aggregate drive, and two (2) to the 15 foot depth for the retention pond;
- laboratory testing of selected soil samples;
- engineering analyses and evaluations; and,
- the preparation of this report by the Geotechnical Engineer.

The locations of the soil borings are shown on Figures 2 and 3, and the Soil Boring Logs are included in the Appendix. The results of the field and laboratory testing programs are shown on the Soil Boring Logs, and on other figures in the Appendix, where applicable. Finally, a Description of the Field and Laboratory Testing Procedures is also included in the Appendix.

3. Site Conditions. The site conditions described in this section are based on our field observations, and a review of available topographic and geologic data and historical aerial photographs of the site, as discussed below.

3.1 Field Observations. The project area is located in an agricultural field that was vegetated with tall (i.e., 4 to 5 feet high) grass and weeds at the time of our field investigation. Dumped excavation spoils of soil, asphalt pieces, and miscellaneous construction debris (e.g., pieces of PVC pipe) were observed near an entrance from LA Highway 101 on the east side of the site. The new Lacassine Athletic Complex is currently under construction immediately south of the site, and similar agricultural land borders the site to the west and north; the latter largely overgrown with tall brush and small trees. Overall, the site appears to be fairly flat and level, with fair to poor drainage.

3.2 Topography. It is estimated that the center of the project area is located at an approximate latitude and longitude of N 33° 14.146' and W 92° 55.853', respectively. The appropriate U.S.G.S. Topographic Map (i.e., Figure 1) indicates that the site is at an elevation of about EL +20 or so, with site grades generally dropping off from the northwest to the southeast. No other topographic information was provided for our use.

3.3 Geology. According to the Geologic Map of Louisiana (Pope, et al, 1984), the site is underlain by the Prairie Formation of Pleistocene Age. These soils are described as "Light gray to light brown clay, sandy clay, silt, sand, and some gravel."

3.4 Historical Aerial Photographs. According to historic aerial photographs available on Google Earth® (i.e., Figure 2), the appears to have undergone very little change (aside from vegetation) since at least the March 1998 photograph, the earliest available legible photograph. Some appearance of construction activities (e.g., areas of bare earth, apparent earth stockpiles, etc.) is evident on the east side of the site in the December 2022 photograph. Many of the photographs indicate the presence of what appears to be an overgrown rice levee forming a large circle centered over the center of the site.

Please note that this discussion of site conditions is necessarily general in nature, and that a comprehensive description of current or previously existing site conditions is beyond the scope of this investigation. Reference is made to Figures 1, 2 and 3 in the Appendix, and the other sources noted herein.

4. Soil and Ground Water Conditions. In general, the soils encountered in the soil borings made for this project were fairly consistent, as summarized in the following table.

Generalized Soil Stratification⁽¹⁾

<u>Depth⁽²⁾ (ft)</u>	<u>Soil Description</u>
0 to 1 to 2 (B-6 & B-7)	Firm SANDY or CLAYEY SILT (CL-ML), w/ roots – very poor
0 to 2	Stiff to very stiff gray & red CLAY (CH), w/ lots of red oxide nodules
2 to 6	Very stiff to hard light gray & tan to brown SILTY CLAY (CL), w/ tan to brown & black oxides & light gray silt streaks
6 to 10	Stiff to very stiff light gray & tan to brown SILTY to SANDY CLAY (CL), w/ tan to brown & black oxides & light gray silt streaks
10 to 12	Stiff to very stiff light gray & tan to brown CLAY (CH), w/ tan to brown & black oxides & light gray silt streaks
12 to 50	Stiff to very stiff light gray & tan to brown CLAY (CH) or SILTY CLAY (CL), w/ tan to brown & black oxides & light gray silt streaks

⁽¹⁾ Soil Stratification Varied. Refer to Boring Logs in Appendix.

⁽²⁾ Depths Measured From Existing Ground Surface

The borings were (initially) advanced using dry auger methods to determine the presence of and the hydrostatic conditions of ground water in the boreholes. Ground water was not encountered to at least the 25 foot depth in the deeper boring (i.e., B-1), at which time rotary wash drilling methods were utilized, which make further ground water readings impractical. Ground water was not encountered at any time in the shallower borings made for this investigation. The depth to ground water can fluctuate with seasonal variations in rainfall and evaporation, etc., but is typically first encountered in this area from about the 8 to 12 foot depth, and will generally rise to about the 4 to 6 foot depth after a period of time. Much shallower ground water levels (i.e., “perched water”) can often be observed after periods of precipitation. The actual depth to ground water should be determined more accurately at the time of construction.

The information contained in this section has been generalized from the data obtained from all of the soil borings made for this investigation, and is meant to provide a general overview of the soil and ground water conditions. For more specific information, refer to the Boring Logs in the Appendix.

GEOTECHNICAL RECOMMENDATIONS

5. General Considerations. Geotechnical aspects of this project include Site Preparation and Earthwork; foundations for the Ground Storage Tank(s), the Filter Building, the Pump and Electrical Building, and miscellaneous structures; the Retention Pond; and the Aggregate Drive. These items are discussed in general in this section, and in more detail in the following sections of this report.

5.1 General. Surface drainage appeared to be relatively fair to good at this site. Establishing and maintaining good drainage will be critical for earthwork and foundation construction at this site; otherwise, significant construction difficulties and/or additional measures (e.g., additional undercutting, subgrade stabilization, etc.) can be expected to be required. Performing earthwork operations during wet weather conditions and/or after long, wet periods should be avoided. Dewatering is not expected to be necessary for shallow excavations (i.e., less than about 2 to 4 feet) at this site. If minor dewatering is required (e.g., after periods of inclement weather, etc.), sump and pump methods may be suitable if large enough pumps are utilized and the contractor is diligent. Otherwise, or for deeper excavations, other measures may be required.

5.2 Site Preparation and Earthwork. All vegetation and roots; any soft, wet, or weak soils that yield excessively under the inspection activities (e.g., a proofroll) or construction operations; or any other unsuitable materials uncovered during the stripping of the project area should be removed as necessary during the site preparation activities. An initial undercut of 1 to 2 feet should be anticipated to expose firm natural clayey soils free of excessive vegetation or roots, etc.

In addition, the underlying clay is relatively "fat" (i.e., it has relatively high liquid limits and plasticity indices) and dry (i.e., natural moisture contents are below the plastic limits), and therefore has a moderate to high potential for shrink / swell movements with fluctuations in moisture content (i.e., it is moderately expansive). The likelihood and/or the magnitude of expansive soil movements are difficult to predict, but if they do occur, they can cause significant distress to building foundations and floor slabs. Consideration should be given to removing these fat clays to some depth and replacing with compacted select fill as part of the site preparation activities to help reduce the potential for expansive movements.

The unsuitable materials described above should be removed from the tank and building areas and replaced with compacted select fill as part of the site preparation activities. Ideally, this undercut, when combined with the new fill that is to be placed to achieve the desired subgrade elevations, should provide a new, uniform building pad of compacted select fill that is at least 4 feet thick (i.e., 2 feet below the bottom of the footings and/or grade beams, and 4 feet below the bottom of the slab). The more new, net fill to be placed, the less undercut that has to be made; however, a minimum of 1 to 2 feet of undercut (i.e., the silty soils) should be anticipated.

Reference is made to the Recommended Procedure for New Building Pad in Figure 4 of the Appendix.

Additional undercutting and/or subgrade stabilization / treatment may be considered, if necessary, to help provide a stable working surface upon which to conduct further earthwork or foundation construction activities. Once a stable subgrade surface is achieved, compacted select fill may be placed, as needed, to establish the desired subgrade elevations.

Recommendations for site preparation and earthwork activities are provided in Section 6.

5.3 Shallow Foundations for the Ground Storage Tank. Once the tank pad has been properly constructed, as described in Sections 5.2 and 6, the ground storage tank(s) (GST's) may be ground-supported with (a) concrete ringwall type foundation(s), as planned.

This foundation is described as Type 1 by the AWWA Standard D100-96, and is a commonly accepted means of supporting ground storage tanks. A shallow, conventionally reinforced concrete footing is placed around the perimeter of the tank (i.e., a ringwall), which serves to support the tank shell and confine the underlying subgrade soils. This type of foundation allows the use of anchor bolts, if required. It is also much less likely to create the condition of a confined "pool" or "reservoir" of water beneath the bottom of the tank in the gravel pad described in the following paragraph (and the corresponding concerns for support). Recommendations for a shallow ringwall-type foundation for the ground storage tank(s) are provided in Section 7.

5.4 Shallow Foundations for Buildings and Miscellaneous Structures. The Filter Building, the Pump and Electrical Building, and other miscellaneous structures should also be able to be supported on shallow foundations, once the building pad(s) has (have) been properly constructed (i.e., in accordance with Sections 5.2 and 6). The use of a reinforced slab foundation (i.e., a "ribbed slab") is recommended for the building structures to provide rigidity in the foundations to help resist differential soil movements. The foundation may be conventionally reinforced (with "rebar" and welded wire mesh) or post-tensioned with high strength steel tendons. This approach has been used successfully on many projects in this area, but will not guarantee that some movements won't occur, particularly if extreme conditions of moisture change (e.g., extended droughts or periods of excessive rainfall, etc.) and/or severe loading conditions occur. In any event, the higher the quality of the earthwork construction, and the stiffer the foundation is constructed, the less likely are the chances for the movements described above. Miscellaneous structures like the filter units and canopy should also be able to be supported by individual shallow foundations. Recommendations for shallow foundations are provided in Section 8.

5.5 Retention Pond. The retention pond should also be designed in such a manner that the slopes are stable and resistant to erosion. These considerations are discussed in Section 9.

5.6. Aggregate Drives. The aggregate drive, and the laydown area, should be adequately supported by the subgrade soils and/or new fill once it is placed. Recommendations for aggregate surfaces are provided in Section 10.

6. Site Preparation and Earthwork Activities. Site Preparation and Earthwork Activities for this project should be performed in accordance with the following recommendations.

6.1 General. As noted in Section 5, establishing and maintaining good drainage will be critical for earthwork and foundation construction at this site. Poor drainage and/or wet conditions at the time of construction can be expected to cause delays and/or cost overruns due to additional undercutting or stabilization measures. The contractor should be prepared to make every reasonable effort to provide dry working conditions (i.e., cut drainage ditches prior to earthwork activities; thoroughly “process,” or dry the subgrade soils, if necessary; and take advantage of dry weather conditions; etc.). Standing water on the subgrade or in any excavations should be promptly drained or pumped off. Another desirable practice is to avoid “opening up” larger areas for earthwork than can be successfully completed before inclement weather conditions occur. A good discussion of the normal earthwork construction methods that should be attempted by the contractor before resorting to undercutting or stabilization measures is provided in Section 203.07.02, Surface Layer Preparation, of the LA DOTD *Louisiana Standard Specifications for Roads and Bridges (LSSRB)*, 2016 Edition).

All site preparation and earthwork activities should be inspected and tested by qualified Construction Material Testing (CMT) personnel experienced in earthwork construction. This should include full-time inspection of the site preparation and testing of fill placement and compaction. These services are essential for the reliable construction of this project.

6.2 Site Preparation. All vegetation and roots; any soft, wet, or weak soils that yield excessively under the inspection activities (e.g., a proofroll) or construction operations; or any other unsuitable materials uncovered during the stripping of the project area should be removed as necessary during the site preparation activities. An initial undercut of 1 to 2 feet should be anticipated to expose firm natural clayey soils free of excessive vegetation or roots, etc. Additional undercut should be made as required to achieve the minimum building pad thickness described in Section 5.2.

The exposed subgrade surface should be inspected to ensure that a suitable surface exists upon which to place select fill, if required, or to support shallow mat or slab-on-grade type foundations. This inspection may include proofrolling the subgrade with a loaded, tandem-axle dump truck or other means as determined by the inspector. The subgrade material will be sensitive to moisture, and will likely pump

and rut excessively if it is wet and/or if exposed to excessive (or even moderate) construction traffic. Any areas that are determined to be unsuitable for fill placement should be further undercut or treated to achieve a stable subgrade surface. The amount of subgrade exposed at any given time should be limited to that which can be properly processed and backfilled before inclement weather or construction traffic, etc., can deteriorate the approved subgrade.

6.3 Subgrade Treatment. Treatment of the subgrade may be considered, if necessary, to help provide a firm working table upon which to conduct fill operations or support shallow foundations. Lime treatment should be effective in the shallow (i.e., 4 foot deep or less) clayey subgrade soils encountered during this investigation. Lime treatment is considered suitable for clayey soils with plasticity indices of about 7 or higher.

Treatment to stabilize the subgrade soils should be performed in accordance with *LSSRB*, Section 305, Subgrade Layer. Section 305 requires that soils to be treated contain no more than 79 percent sand or 69 percent silt and have a plasticity index no greater than 35. A better requirement is to limit silt content to less than 60 percent. Section 305 further calls for lime treatment to be performed in accordance with Section 304, Lime Treatment, Type C (in our opinion, Type D, or working table treatment is sufficient for subgrade treatment).

The treatment percentage should be determined in the lab using a procedure similar to TR 432, or by test strips constructed and evaluated in the field; a treatment percentage of 6 to 8% (by volume) may be assumed for design purposes. The project documents should allow for an adjustment of the treatment percentage based on the results of the lab tests. A full depth, in-place mixer (i.e., a stabilizer machine) should be used to pulverize and mix the treated soil. The pulverization should be checked in accordance with TR 431 and meet the requirements of Table 304-1 (i.e., at least 95 percent of the mixed soil particles should pass the ¾ inch Sieve, and 50 percent should pass the No. 4 Sieve).

6.4 Select Fill. Once a firm subgrade exists upon which to conduct fill operations, select fill may be placed to achieve the desired subgrade elevation, as required. The new fill surface should extend a minimum horizontal distance of 3 feet outside the exterior building lines, and be sloped at a minimum of 10 Horizontal to 1 Vertical (10H:1V), but no steeper than 3H:1V, to facilitate drainage away from the completed foundations.

Ideally, select fill should consist of a silty or sandy clay with a Liquid Limit of 30 to 42 and a Plasticity Index of 12 to 22. The clayey soils encountered in the borings made in the retention pond area (B-5 and B-6), that are under consideration for use as borrow material, do not generally meet these requirements.

Natural clayey soils that do not meet these requirements can be blended (e.g., with sand) and/or treated (e.g., with lime) for improvement. Lime treatment is also

commonly used to expedite fill operations (e.g., to reduce excess moisture). Natural clayey soils used for blending and/or lime treatment should have a maximum liquid limit of 55 and plasticity index of 35 or less. Lime treatment should be performed in accordance with *LSSRB*, Section 304, Type C Treatment. The treatment percentage should be determined using procedure TR 416, or by test strips constructed and evaluated in the field. A suitable in-place mixer (i.e., a stabilizer machine) should be used for all blending and treatment operations. Pulverization should be checked in accordance with TR 431; at least 70 percent of the mixed soil particles should pass the No. 4 sieve. In any case, the proposed fill material and processing procedures should be approved by the engineer before fill placement takes place.

The fill should be placed in 6 to 8 inch thick loose lifts or less and compacted to 95% of the Standard Proctor Maximum Dry Density at $\pm 2\%$ of the Optimum Moisture Content (ASTM D 698). All lifts should be placed on relatively flat, uniform surfaces; fill that is placed against existing slopes should be "benched" into the existing soils in steps at least 2 feet wide and no more than 1 lift thick. Each lift should be tested to ensure compliance with these recommendations prior to placing subsequent lifts. A minimum testing frequency of one test per 2,500 square feet, but not less than 3 tests, per lift is recommended. All completed lifts of fill should be protected from adverse weather and construction traffic, etc., and any areas that are adversely affected should be reworked as necessary to re-establish the recommended compaction criteria before placing additional fill.

7. Shallow, Ringwall-Type Foundations for the Ground Storage Tank. Following the completion of the site preparation and earthwork (fill) as described in Sections 5 and 6, a shallow, concrete ringwall-type foundation should be suitable for the support new ground storage tank. As noted in Section 5, the ringwall foundation is described as Type 1 by AWWA Standard D100-96.

A ringwall foundation will serve to confine the shallow bearing soils beneath the tank and provide additional support for the tank walls. The use of a ringwall foundation will also support the use of anchor bolts, if desired. Recommendations for ringwall foundations for the ground storage tank are provided in the following paragraphs.

7.1 Bearing Capacity. The tank planned for this project is estimated to apply a maximum net bearing pressure of about 2,100 pounds per square foot (psf) or so under full stage loading conditions. The new fill pad and underlying natural soils at this site should have a maximum ultimate bearing capacity of at least 6,500 psf or so under these loading conditions, yielding a minimum computed factor of safety well in excess of the minimum recommended value of 1.5 against shear failure of the foundation soils.

Net allowable soil capacities take into account the weight of the concrete and backfill below grade; thus, no adjustments to the design loads are necessary. The bearing capacities provided in this section include a factor of safety of at least 2 against shear failure of the bearing soils. A minimum footing width of 18 inches is

recommended to minimize the possibility of shear “punch” failure of the bearing soils.

7.2 Settlements. Settlement movements under the new tank, if fully loaded at all times, are expected to be on the order of 1½ to 3 inches or less at the center and ¾ to 1½ inches or less at the edges of the tank. More likely, though, the tank will not be fully loaded at all times, yielding expected settlement movements of about half these amounts. These settlement estimates are considered to be accurate to within $\pm 33\%$.

7.3 Lateral Loads. Lateral loads on shallow ringwall foundations will be resisted by “hoop” steel reinforcement (i.e., the continuous, circular reinforcing steel in the ringwall), and by sliding resistance between the base of the foundation and the underlying soil and lateral earth pressure against the side of the foundation. Lateral resistance due to earth pressures should be neglected. The allowable sliding resistance, $f_{s, \text{all}}$, may be taken as 0.2 times the applied bearing pressure, not to exceed a value of 250 psf. This is an allowable value; a safety factor of about 1½ to 2 against sliding resistance has already been included.

7.4 Uplift Loads. Foundations placed to depths of about 4 feet or less should be designed for uplift by taking into account the dead weight of the concrete and any overlying backfill. A typical unit weight of 120 pounds per cubic foot (pcf) should be utilized for the soil backfill if properly placed and compacted (refer to Section 6). Granular soils should not be used for backfill over foundations subject to uplift because the soils could become saturated if poor drainage exists. Buoyant unit weights (i.e., subtract the unit weight of water, 62.4 pcf) should be used for uplift calculations if proper drainage cannot be assured.

7.5 Ringwall. The concrete ringwall around the tank perimeter will help facilitate tank erection and support the tank sides. The ringwall should bear within the new fill or the stiff underlying clays at a minimum depth of 2 feet below finished grade. The top of the ringwall foundation should be at least 6 inches above the exterior finished grade.

The ringwall thickness and reinforcement should be determined by a qualified structural engineer. An at-rest earth pressure coefficient of 0.7 may be utilized for this determination, along with a soil unit weight of 120 pounds per cubic foot (pcf). In any case, a minimum ringwall thickness of 18 inches is recommended. Concrete for the ringwall should be placed neat against the newly placed select fill or stiff natural soils at this site.

7.6 Tank Pad. Ground supported tanks are normally placed upon a 3 inch minimum thick pad of well-graded, clean oiled sand or crushed gravel located within the ringwall. The clean sand should meet the gradation requirements of Section 1003.08.1, Fine Aggregate (Concrete Sand), from the *Louisiana Department of Transportation and Development Standard Specifications for Roads and Bridges, 2016 Edition*. The crushed gravel should meet the requirements of Section 1003.03.1, Stone.

The AWWA Standard specifies that the oiled sand mixture consist of approximately 18 gallons of No. 2 fuel oil per cubic yard of sand. Where environmental concerns exist regarding the use of an oiled sand cushion, either a clean crushed rock, clean sand, or asphaltic road mix may be used for the tank pad. Reference is made to the AWWA Standard for additional details regarding the requirements for tank pads.

The center of the pad should be crowned to accommodate the anticipated long term differential center to edge settlements. A minimum slope of 1 inch vertical to 10 feet horizontal is recommended by the AWWA Standard. The space between the bottom of the tank and the top of the ringwall (1 inch minimum) should be grouted, per the Standard.

The tank should be elevated above the surrounding grade to provide for proper drainage of surface water away from the tank. This is normally accomplished by extending the ringwall at least 6 inches above exterior finish grade and sloping the outside grade down and away from the ringwall.

7.7 Observations. It is recommended that at least eight (8) permanent telltale points be established at equal intervals around the perimeter of the tank, and their elevations determined before the tank is loaded. As water is added, the telltale elevations should be monitored at every 5 foot increment of water level to aid in detecting any soils related problems that may develop during the loading of the tank. Although no such problems are expected, timely analysis of this data can aid in their detection. Provisions should be made such that the water level may be lowered at a rate of 2 feet per hour during the water load test, if necessary.

7.8 Construction Considerations. Shallow excavations (i.e., 4 feet deep or less) for foundations in firm clayey soils at this site should remain stable (i.e., should not cave) for short periods of time, particularly in the absence of surface or ground water. Deeper excavations, excavations in sandy soils, or excavations that remain open for longer periods of time could be subject to significant ground or surface water intrusion.

The reinforcing steel and concrete for the foundations should be placed expeditiously following the completion of the excavation. The excavations should not be permitted to stand open any longer than necessary. Any water that may accumulate in the excavations should be pumped out immediately.

The soils at this site can become significantly weaker if wetted or disturbed during the construction operations. Traffic in the excavations should be prohibited, and drainage should be provided to direct surface and ground water (if any) away from the excavations. If the concrete for the foundation will not be placed on the same day as the excavation, a "mud mat" of lean concrete should be placed to protect the bearing surface.

According to OSHA regulations (CFR 1926.650 through 1926.652, and Appendix A to Subpart P), the contractor is responsible for developing and maintaining the appropriate safety systems for excavations on the project. The soils should be classified as Type C for this purpose. Recommendations for temporary slopes and/or shoring are beyond the scope of this investigation, but can be provided upon request once more specific design details are available.

All excavation and concreting operations should be inspected and tested by qualified Construction Material Testing (CMT) personnel experienced in shallow foundation construction. This should include full-time inspection of the foundation excavations and testing of concrete placement. These services are essential for the reliable construction of shallow foundations for this project.

8. Shallow Foundations for Buildings and Miscellaneous Structures. Following the completion of the Site Preparation and Earthwork activities described in Section 6, shallow foundations should be suitable for the support of the new Buildings and miscellaneous structures, provided some settlement and/or other minor soil movements can be tolerated, as described in Section 5.2. A reinforced slab foundation is recommended for the buildings to help accommodate soil movements; individual shallow foundations may be used for miscellaneous structures like the filter units and canopy.

8.1 Reinforced Slab (or “Ribbed”) Foundation. A reinforced slab foundation consists of a monolithic slab-on-grade with turned-down edges (perimeter grade beams); interior grade beams may be included if required by the building loads and/or stiffness considerations. The perimeter grade beams function as shallow foundations to carry the exterior wall loads and serve to cutoff moisture fluctuations in the soils supporting the slab from the surrounding environment. Interior grade beams serve to stiffen the slab system, allowing it to better accommodate movements in the supporting soils. Interior grade beams should be located beneath any load bearing interior walls and/or columns, in which case they should be designed as a shallow foundation. The spacing and dimensions of the interior grade beams should be determined by the structural engineer, if applicable; typically, a maximum spacing of 15 feet or less (each way) is utilized. Adequate reinforcement, as determined by the structural engineer, should be provided in the slab-on-grade foundation and grade beams. The entire slab system should be placed monolithically (in one pour), or dowelled to provide equivalent rigidity.

The slab foundation may be reinforced with conventional reinforcing steel (rebar and welded wire mesh) or post tensioned steel tendons (i.e., a post-tensioned slab). The grade beam and slab dimensions and reinforcement of either foundation system should be determined by a qualified design professional knowledgeable in the design of slabs-on-grade.

It is recommended that consideration be given to placing a suitable polyethylene vapor barrier and a granular leveling layer beneath the floor slab. The practice of

and the details of using a vapor barrier and/or granular leveling layer beneath slabs are left to the discretion of the project designer.

8.2 Bearing Capacity and Soil Movements. Shallow foundations or load bearing grade beams should bear within the new, properly placed and compacted fill pad described in Sections 5 and 6. Shallow foundations or load bearing grade beams bearing designed in accordance with these recommendations may be designed for a maximum net allowable soil bearing capacity of 2,000 pounds per square foot (psf); capacities for column footings may be increased to 2,600 psf. The exterior grade beams should extend to a depth of at least 2 feet below finished exterior grades to help minimize moisture fluctuations in the foundation soils.

Net allowable soil capacities take into account the weight of the concrete and backfill below grade; thus, no adjustments to the design loads are necessary. The bearing capacities provided in this section include a factor of safety of at least 2 against shear failure of the bearing soils. A minimum footing or grade beam width of 18 inches (24 inches for column footings) is recommended to minimize the possibility of shear “punch” failure of the bearing soils.

Post-construction soil movements from normal foundation settlements are expected to be on the order of one inch or less. Differential movements should be about one-half to two-thirds of the total observed movement.

8.3 Rectangular Footings and Overturning. Capacities for rectangular footings may be increased according to the following formula:

$$q_r = q_w (1 + 0.3 B/L)$$

where q_r = net allowable bearing pressure for rectangular footings (psf)
 q_w = net allowable bearing pressure for continuous footings given in Section 8.2 (psf)
 B = footing width
 L = footing length ($L > B$)

Resistance to overturning loads should only consider the **effective** footing area, i.e., the portion of the footing centered beneath and effective in carrying the load. The equivalent footing dimensions B' and L' of the effective footing area are defined as:

$$B' = B - 2e_B \quad \text{and} \quad L' = L - 2e_L$$

where e_B and e_L are the eccentricity in each direction. Eccentricity is defined as the moment (M) divided by the axial load (P), or

$$e_B = M_B / P_B \quad \text{and} \quad e_L = M_L / P_L$$

8.4 Lateral Loads. Lateral loads on the foundation will be resisted by sliding resistance between the base of the foundation and the underlying soil and by lateral earth pressure against the side of the foundation; the latter should be neglected for shallow foundations for this project. The allowable sliding resistance, $f_{s, all}$, may be taken as 0.2 times the applied bearing pressure, not to exceed a value of 250 psf. This is an allowable value; a safety factor of about 1½ to 2 against sliding resistance has already been included.

8.5 Uplift Loads. Foundations placed to depths of about 4 feet or less should be designed for uplift by taking into account the dead weight of the concrete and any overlying backfill. A typical unit weight of 120 pounds per cubic foot (pcf) should be utilized for the soil backfill if properly placed and compacted (refer to Section 6). Granular soils should not be used for backfill over foundations subject to uplift because the soils could become saturated if poor drainage exists. Buoyant unit weights (i.e., subtract the unit weight of water, 62.4 pcf) should be used for uplift calculations if proper drainage cannot be assured.

8.6 Construction Considerations. Shallow excavations (i.e., 4 feet deep or less) for foundations in firm clayey soils at this site should remain stable (i.e., should not cave) for short periods of time, particularly in the absence of surface or ground water. Deeper excavations, excavations in sandy soils, or excavations that remain open for longer periods of time could be subject to significant ground or surface water intrusion. Caution should be exercised so that the existing building foundations are not undermined.

The reinforcing steel and concrete for the foundations should be placed expeditiously following the completion of the excavation. The excavations should not be permitted to stand open any longer than necessary. Any water that may accumulate in the excavations should be pumped out immediately.

The soils at this site can become significantly weaker if wetted or disturbed during the construction operations. Traffic in the excavations should be prohibited, and drainage should be provided to direct surface and ground water (if any) away from the excavations. If the concrete for the foundation will not be placed on the same day as the excavation, a "mud mat" of lean concrete should be placed to protect the bearing surface.

According to OSHA regulations (CFR 1926.650 through 1926.652, and Appendix A to Subpart P), the contractor is responsible for developing and maintaining the appropriate safety systems for excavations on the project. The soils should be classified as Type C for this purpose. Recommendations for temporary slopes and/or shoring are beyond the scope of this investigation, but can be provided upon request once more specific design details are available.

All excavation and concreting operations should be inspected and tested by qualified Construction Material Testing (CMT) personnel experienced in shallow foundation

construction. This should include full-time inspection of the foundation excavations and testing of concrete placement. These services are essential for the reliable construction of shallow foundations for this project.

9. Retention Pond. The retention pond should be designed to have sufficient slope stability and erosion control. These considerations are discussed in the following paragraphs.

9.1. Slope Stability. The finished slopes of the pond should be limited to 3 Horizontal to 1 Vertical (3H:1V) or flatter. A small part of the slopes near the water's edge (4 foot deep or less) may planned to be 1H:1V, followed by a flat, 5 foot or so wide shelf, to help limit vegetative growth in the shallow edge waters of the ponds (if applicable). This is a desirable practice; however, some sloughing of the steeper slope might be expected, especially if the water level drops below the top of the slope, resulting in a "rapid drawdown" type of situation. This can probably be alleviated by routine maintenance, if necessary.

9.2. Erosion Control / Revetment. The slopes of the completed detention ponds should be protected from erosion and pest invasion. Suitable vegetation (e.g., hydroseeding) is expected to be sufficient, provided it is established and maintained while the slopes are in good condition, although the final determination is left to the project designer. In critical areas, or where water flow might occur, revetment (or armor, e.g., concrete mattresses) might be considered for additional protection. Regular inspection should be performed periodically to ensure the integrity of the slopes.

9.3 Construction Concerns. Excavations for the ponds should remain within clayey soils, and are expected to be able to maintain relatively steep temporary slopes. According to OSHA regulations (CFR 1926.650 through 1926.652, and Appendix A to Subpart P), the contractor is responsible for developing and maintaining the appropriate safety systems for excavations on the project. The soils should be classified as Type C for this purpose. Recommendations for temporary slopes and/or shoring are beyond the scope of this investigation.

10. Aggregate (Gravel) Surface Course. The areas to be surfaced with crushed limestone aggregate should be prepared in accordance with Section 6, and the exposed surface graded to promote good drainage. A suitable non-woven geotextile (US Fabrics US 160NW, or equal) should be provided between the aggregate surface course and the subgrade to prevent the mixing of the aggregate and subgrade. A biaxial geogrid (e.g., Tensar® BX 1200, or equal) or a composite geosynthetic consisting of a non-woven geotextile bonded to a biaxial geogrid (e.g., Baselok® Fabgrid® FG1200) may also be considered to provide additional strength to the aggregate surface course.

At least 6 to 8 inches of crushed (i.e., angular), high durability, well graded, aggregate should then be placed on the filter fabric to establish the aggregate surface section for lightly loaded passenger vehicles (10 to 12 inches if heavier vehicle loads are expected). The aggregate should meet the gradation requirements of the Louisiana Standard

Specifications for Roads and Bridges (LSSRB), Section 1003.03.1 Stone. Locally available products known as 610 Road Base or No. 57 Stone, although not strictly meeting 1003.03.1, should be suitable for use as aggregate surfacing.

The aggregate surface course should be compacted with a smooth drum roller until no deflection is observed. It should be anticipated that the placement and grading of additional aggregate will be required in any areas that deflect excessively.

The long term performance of the aggregate surface course will depend upon the quality of the initial construction, the degree to which good drainage exists, and the frequency and magnitude of the vehicular loads. In any case, regular placement and grading of additional aggregate should be anticipated to maintain the condition of the aggregate surface course.

OTHER GEOTECHNICAL CONSIDERATIONS

11. Drainage. Proper long term drainage should be provided to direct surface water away from the completed foundations. Underdrains, as well as positive site grading, should be utilized for this purpose as required.

12. Additional Consulting Services. The Geotechnical Engineer should be kept informed of and permitted to address all aspects of the soils-related aspects of the project. Often, concerns may arise that are not specifically addressed by the Geotechnical Engineering Report. A brief conference can often address any such concerns, and can identify any other issues not anticipated by the design team.

Upon completion of design, and prior to the start of construction, the Geotechnical Engineer should be provided with the opportunity to review the design drawings and specifications to assure compliance with the Geotechnical Engineering Report. Such review is considered to be an integral part of the recommendations of this report.

13. Construction Materials Testing (CMT) Services. Construction Materials Testing (CMT) services for this project are essential to assure that the soil conditions do not vary from that assumed in this report and to ensure that the recommendations in this report are followed. These services should be retained by the owner to assure that unbiased reporting is provided. The Geotechnical Engineer of Record should be provided with timely copies of all test results. Otherwise, the suitability of these recommendations and/or the performance of the earthwork and foundations for this project cannot be assured.

14. Construction Means and Methods and Contractor Submittals. The Contractor's means and methods can have a substantial effect on the successful execution of the project activities. The Contractor is necessarily responsible for the means and methods employed to accomplish the work scope. Nothing in this report should be construed as dictating the Contractor's means and methods, nor should the project documents dictate the means and methods used by the Contractor.

Certain aspects of the work (e.g., dewatering of excavations, scheduling of work activities, fill placement and compaction, foundation construction, etc.) will require expertise and/or skilled planning and execution on the part of the Contractor. It is advisable that the Contractor be required to submit acceptable work plans for such activities that clearly demonstrate that the Contractor can perform the work satisfactorily. However, it should be clearly understood by all parties that acceptance or acknowledgement of any such submittals does not imply responsibility of the Contractor's means and methods by the engineer(s) or the owner.

15. Limitations. This report is based upon the information provided by the owner's representative, as well as the soil and ground water conditions encountered during the field investigation. Variations may occur away from or between the borehole locations. If such variations become apparent, or if the nature of the project changes significantly, the Geotechnical Engineer should be consulted for additional recommendations.

The recommendations in this report pertain only to the soils-related aspects of the project. The structural design of the foundations is beyond the scope of these services. Likewise, this report does not address the environmental aspects of the project. We would be pleased to assist with these additional services if requested.

16. Compliance with Applicable Standards and Regulations. All geotechnical and related civil aspects of this project should be designed and constructed in compliance with the latest editions of any and all applicable building standards and regulations. These should include but not be limited to concrete and reinforcing steel standards by the American Concrete Institute (ACI), applicable sections of the International Building Code (IBC) and ASCE/SEI 24 (Flood Resistant Design and Construction), safety standards by the Occupational Safety and Health Administration (OSHA), and any other applicable local, state, or federal building standards, codes or permit requirements. Nothing contained in this report is intended to conflict with or should be construed to supersede any such applicable standards and regulations.

APPENDIX

U.S.G.S. Topographic Map / Site Vicinity Map (Figure 1)

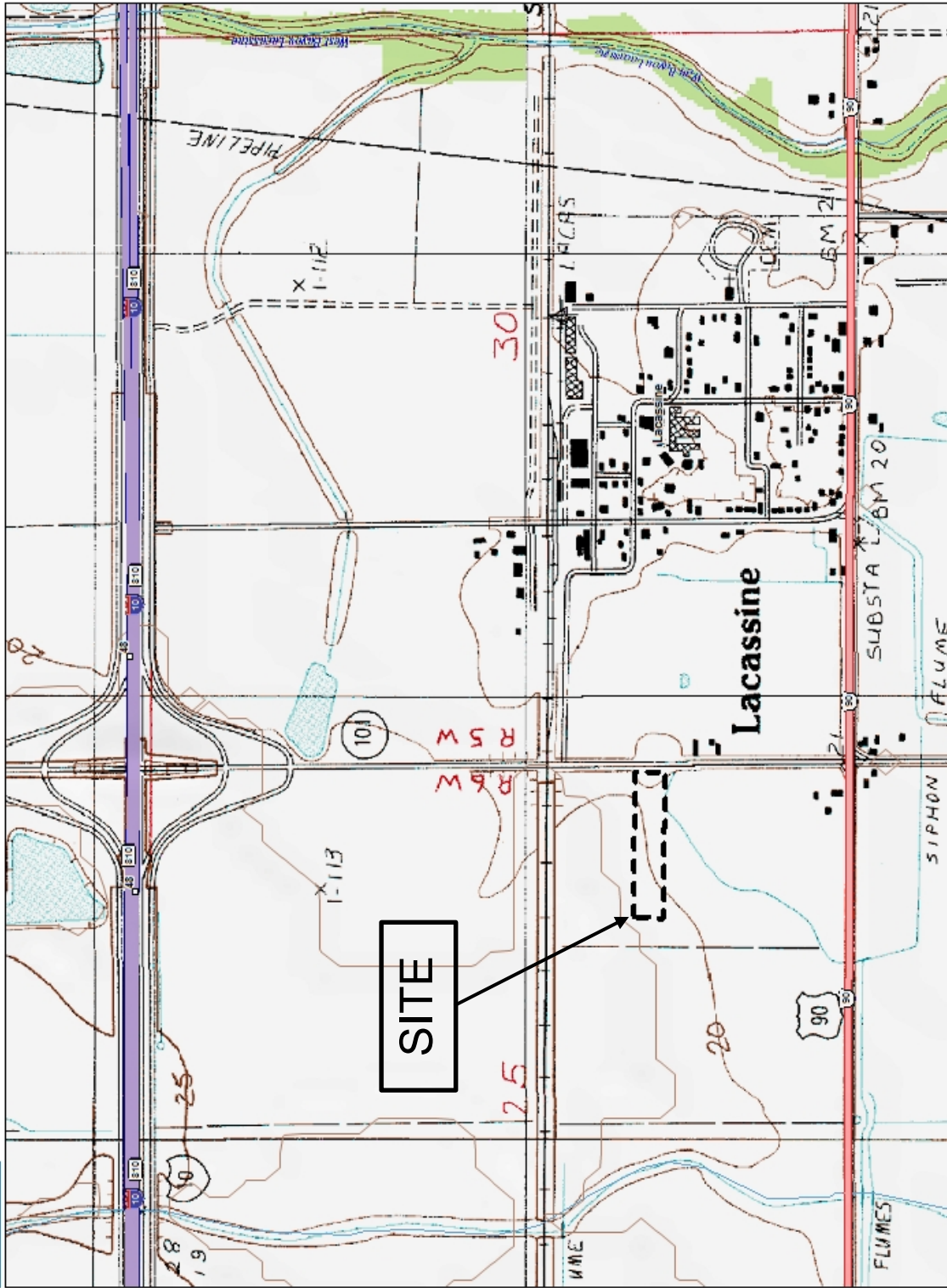
Aerial Photograph / Boring Location Plan (Figure 2)

Site Plan / Boring Location Plan (Figure 3)

Recommended Procedure for New Building Pad (Figure 4)

Soil Boring Logs (9)

Description of Field and Laboratory Testing Procedures



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Daniel J. Holder, P.E., Inc. Consulting Geotechnical Engineer 2767 Scarborough Drive Lake Charles, LA 70615 (337) 274-4125 dan@danholderpe.com	Lacassine Water Treatment Plant Lacassine, Louisiana for Meyer & Associates, Inc. Sulphur, Louisiana	Project Engineer: DJH DJH File No. 24-045 Drawn By: dan Date: 22 Jan 2025 Checked By: <i>BJH</i> Figure No. 1 Site Vicinity Map / U.S.G.S. Topographic Map

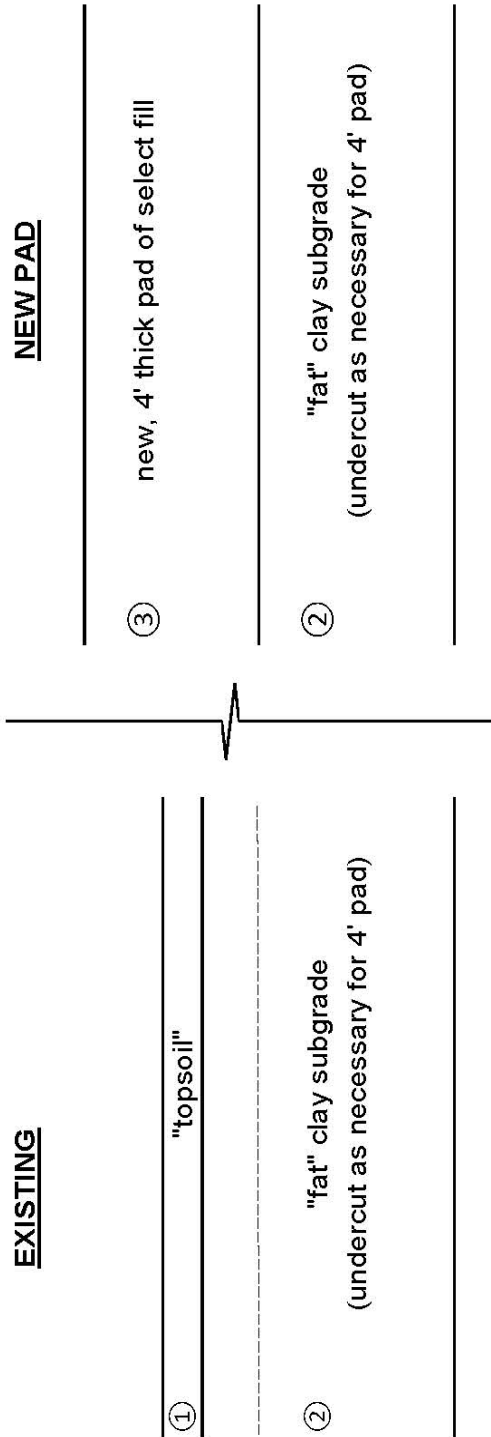
Source: U.S.G.S. 7.5 Minute Topographic Map, 1999 (3-D TopoQuads, DeLorme)



Daniel J. Holder, P.E., Inc. Consulting Geotechnical Engineer 2767 Scarborough Drive Lake Charles, LA 70615 (337) 274-4125 dan@danholderpe.com	Lacassine Water Treatment Plant Lacassine, Louisiana for Meyer & Associates, Inc. Sulphur, Louisiana	Project Engineer: DJH Drawn By: dan Checked By: <i>DMH</i>	DJH File No. 24-045 Date: 22 Jan 2025 Figure No. 2
		Aerial Photograph / Boring Location Plan	

Source: Google Earth® Aerial Photograph dated 6/2024

RECOMMENDED PROCEDURE FOR NEW BUILDING PAD



- ① Remove all "topsoil" and other unsuitable materials to expose firm clayey subgrade.
- ② Remove (undercut) enough "fat" clay subgrade to provide at least 4' thick building pad below bottom of design floor slab elevation, and 2' below bottom of any footings or grade beams.
- ③ Place and compact new, select fill pad (at least 4' thick) in 6" to 8" loose "lifts". Test each lift in at least three (3) locations for compaction and material verification.

NOTE: Refer to Sections 5 and 6 of Geotechnical Engineering Report

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	Project Engineer: DJH DJH File No. 24-045			
	Drawn By: dan Date: 22 Jan 2025			
	Checked By: <i>BJH</i> Figure No. 4			
Recommended Procedure for New Building Pad				

SOIL BORING LOG

Boring No. B-1

Page 1 of 2

Project: Lacassine Water Treatment Plant
 Location: LA Highway 101
 Lacassine, Louisiana
 Client: Meyer & Associates, Inc.
 Sulphur, Louisiana

DJH File No: 24-045
 Date Drilled: 12/13/2024
 Logged By: Silas Henrich
 Drilled By: Data Acquisition Services
 Equipment: Ardco Top Drive (Buggy)

Depth (ft)	Field Tests			Laboratory Tests							Notes / Other Tests	Symbol	Description
	Sample Type	Penetrometer (tsf) or SPT (bpf)	Ground Water	Qu / UU (tsf)	Dry Density, γ_d (pcf)	Moisture Content, w (%)	Atterberg Limits						
							Liquid Limit, %	Plastic Limit, %	Plasticity Index, %				
1	ST	2½ tsf		1.5	97	21	45	20	25	$\epsilon_f = 5.7\%$		Stiff gray CLAY (CH), w/ lots of red oxides & gray silt streaks	
2													
3	ST	4 tsf		3.9	112	16				$\epsilon_f = 10\%$		Very stiff gray w/ brown slightly SILTY CLAY (CL), w/ brown oxides	
4													
5	ST	4½ tsf		3.9	114	15	43	16	27	$\epsilon_f = 3.6\%$		- ditto, w/ tan & black oxides & gray silt streaks	
6													
7	ST	2 tsf		1.8	117	12				$\epsilon_f = 2.9\%$		Stiff light gray w/ tan SILTY CLAY (CL), w/ tan oxides & gray silty sand pockets	
8													
9	ST	4 tsf		1.9	107	15	31	18	13	$\epsilon_f = 4.3\%$		Stiff light gray w/ brown SANDY CLAY (CL), w/ brown & black oxides	
10													
11	ST	1½ tsf										Stiff light gray w/ tan CLAY (CH), w/ w/ tan oxides & light gray silt pockets	
12													
13													
14													
15	ST	3 tsf		1.9	105	22				$\epsilon_f = 5.0\%$		Stiff light gray w/ tan SILTY CLAY (CL), w/ tan oxides	
16													
17													
18													
19	ST	4½ tsf		2.9	107	23				$\epsilon_f = 6.4\%$		Very stiff light gray w/ tan SILTY CLAY (CL), w/ tan oxides	
20													
21													
22													
23													
24													
25	ST	2½ tsf		2.4	94	28	55	26	29	$\epsilon_f = 2.1\%$		Very stiff brown w/ light gray CLAY (CH), w/ brown & black oxides	
Boring Data						Ground Water Data					Notes / Other Tests		
Boring Advancement:						★ No Ground Water Encountered to 25' Depth; Then Rotary Wash Drilling Methods Were Utilized.					ϵ_f = Failure Strain		
Dry Auger: 0' to 23'													
Rotary Wash: 23' to 50'													
Boring Abandonment:						Sample Type:					Soil Stratification is Approximate		
Boring Grouted w/ Cement						ST: Shelby Tube (ASTM D 1587)							
Bentonite Upon Completion						SS: Split Spoon (ASTM D 1586)							

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SOIL BORING LOG

Boring No. B-1

Page 2 of 2

Project: Lacassine Water Treatment Plant
 Location: LA Highway 101
 Lacassine, Louisiana
 Client: Meyer & Associates, Inc.
 Sulphur, Louisiana

DJH File No: 24-045
 Date Drilled: 12/13/2024
 Logged By: Silas Henrich
 Drilled By: Data Acquisition Services
 Equipment: Ardco Top Drive (Buggy)

Depth (ft)	Field Tests			Laboratory Tests							Symbol	Description
	Sample Type	Penetrometer (tsf) or SPT (bpf)	Ground Water	Qu / UU (tsf)	Dry Density, γ_d (pcf)	Moisture Content, w (%)	Atterberg Limits			Notes / Other Tests		
							Liquid Limit, %	Plastic Limit, %	Plasticity Index, %			
26												From Handheld GPS (approximate): N 30° 14.153' W 93° 55.910'
27												
28												
29	ST	3 tsf		1.2	106	22				$\epsilon_f = 10\%$		Stiff light gray & tan to red SILTY CLAY (CL), w/ tan to red & black oxides & gray silt streaks
30												
31												
32												
33												Very stiff light gray w/ tan CLAY (CH), w/ tan oxides & slickensides
34	ST	2 tsf		2.8	94	30	57	28	29	$\epsilon_f = 6.4\%$		
35												
36												
37												
38												
39	ST	2½ tsf		3.1	97	27				$\epsilon_f = 6.4\%$		Very stiff light gray w/ tan CLAY (CH), w/ tan oxides
40												
41												
42												
43												
44	ST	2½ tsf		2.1	95	28	47	25	22	$\epsilon_f = 4.3\%$		Very stiff light gray w/ reddish brown CLAY (CH), w/ reddish brown oxides - crumbly
45												
46												
47												
48												
49	ST	3½ tsf		1.9	93	33				$\epsilon_f = 1.4\%$		Very stiff reddish brown w/ gray CLAY (CH), w/ reddish brown oxides
50												
Boring Data						Ground Water Data					Notes / Other Tests	
Boring Advancement:						★ No Ground Water Encountered to 25' Depth; Then Rotary Wash Drilling Methods Were Utilized.					ϵ_f = Failure Strain	
Dry Auger: 0' to 23'												
Rotary Wash: 23' to 50'												
Boring Abandonment:						Sample Type:					Soil Stratification is Approximate	
Boring Grouted w/ Cement						ST: Shelby Tube (ASTM D 1587)						
Bentonite Upon Completion						SS: Split Spoon (ASTM D 1586)						

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SOIL BORING LOG

Boring No. B-2

Page 1 of 1

Project: Lacassine Water Treatment Plant
 Location: LA Highway 101
 Lacassine, Louisiana
 Client: Meyer & Associates, Inc.
 Sulphur, Louisiana

DJH File No: 24-045
 Date Drilled: 12/13/2024
 Logged By: Silas Henrich
 Drilled By: Data Acquisition Services
 Equipment: Ardco Top Drive (Buggy)

Depth (ft)	Field Tests			Laboratory Tests							Symbol	Description
	Sample Type	Penetrometer (tsf) or SPT (bpf)	Ground Water	Qu / UU (tsf)	Dry Density, γ_d (pcf)	Moisture Content, w (%)	Atterberg Limits			Notes / Other Tests		
							Liquid Limit, %	Plastic Limit, %	Plasticity Index, %			
1	ST	4½ tsf										From Handheld GPS (approximate): N 30° 14.140' W 93° 55.907'
2												
3	ST	4½ tsf			13	36	17	19				
4												
5	ST	4½ tsf		5.0	114	15				$\epsilon_f = 4.3\%$		
6												
7	ST	4½ tsf			14	35	15	20				
8												
9	ST	2½ tsf										
10												
11	ST	3½ tsf		1.6	95	22	58	26	32	$\epsilon_f = 3.6\%$		
12												
13												
14	ST	3½ tsf										
15												
16												
17												
18												
19	ST	2½ tsf		1.1	100	22	42	17	25	$\epsilon_f = 10\%$		
20												
21												
22												
23												
24	ST	3½ tsf		2.9	103	23				$\epsilon_f = 5.0\%$		
25												
Boring Data						Ground Water Data					Notes / Other Tests	
Boring Advancement:						★ No Ground Water Encountered					ϵ_f = Failure Strain	
Dry Auger: 0' to 25'												
Rotary Wash: n / a												
Boring Abandonment:						Sample Type:					Soil Stratification is Approximate	
Boring Backfilled w/ Soil						ST: Shelby Tube (ASTM D 1587)						
Cuttings Upon Completion						SS: Split Spoon (ASTM D 1586)						

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SOIL BORING LOG

Boring No. B-3

Page 1 of 1

Project: Lacassine Water Treatment Plant
Location: LA Highway 101
Lacassine, Louisiana
Client: Meyer & Associates, Inc.
Sulphur, Louisiana

DJH File No: 24-045
Date Drilled: 12/13/2024
Logged By: Silas Henrich
Drilled By: Data Acquisition Services
Equipment: Ardco Top Drive (Buggy)

Depth (ft)	Field Tests			Laboratory Tests							Symbol	Description																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
	Sample Type	Penetrometer (tsf) or SPT (bpf)	Ground Water	Qu / UU (tsf)	Dry Density, γ_d (pcf)	Moisture Content, w (%)	Atterberg Limits			Notes / Other Tests																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
							Liquid Limit, %	Plastic Limit, %	Plasticity Index, %																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
1	ST	3½ tsf																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													

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SOIL BORING LOG

Boring No. B-4

Page 1 of 1

Project: Lacassine Water Treatment Plant
 Location: LA Highway 101
 Lacassine, Louisiana
 Client: Meyer & Associates, Inc.
 Sulphur, Louisiana

DJH File No: 24-045
 Date Drilled: 12/13/2024
 Logged By: Silas Henrich
 Drilled By: Data Acquisition Services
 Equipment: Ardco Top Drive (Buggy)

Depth (ft)	Field Tests			Laboratory Tests							Symbol	Description
	Sample Type	Penetrometer (tsf) or SPT (bpf)	Ground Water	Qu / UU (tsf)	Dry Density, γ_d (pcf)	Moisture Content, w (%)	Atterberg Limits			Notes / Other Tests		
							Liquid Limit, %	Plastic Limit, %	Plasticity Index, %			
1	ST	3½ tsf										Stiff gray w/ reddish brown CLAY (CH), w/ reddish brown & black oxides - fair
2												
3	ST	4½ tsf		4.2	114	16				$\epsilon_f = 6.4\%$		Hard light gray & tan SILTY CLAY (CL), w/ tan oxides & a large gray silt pocket
4												
5	ST	4 tsf		3.9	117	17	43	19	24	$\epsilon_f = 10\%$		Very stiff light gray & tan SILTY CLAY (CL), w/ tan & black oxides & gray silt streaks
6												
7	ST	3½ tsf		3.5	113	17				$\epsilon_f = 5.7\%$		- ditto, sandy, w/ tan oxides
8												
9	ST	3 tsf		2.3	107	24	51	26	25	$\epsilon_f = 6.4\%$		Very stiff light gray & tan CLAY (CH), w/ brown & black oxides & gray silt pockets
10												
11	ST	2 tsf		1.6	93	31				$\epsilon_f = 7.9\%$		- ditto, stiff, w/ tan oxides & shells
12												
13	ST	3 tsf		2.5	101	24	46	23	23	$\epsilon_f = 7.1\%$		Very stiff tan w/ light gray SILTY CLAY (CL), w/ w/ tan oxides
14												
15												Boring Completed at 15' Depth
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
Boring Data						Ground Water Data					Notes / Other Tests	
Boring Advancement:						★ No Ground Water Encountered					ϵ_f = Failure Strain	
Dry Auger: 0' to 15'												
Rotary Wash: n / a												
Boring Abandonment:						Sample Type:					Soil Stratification is Approximate	
Boring Backfilled w/ Soil						ST: Shelby Tube (ASTM D 1587)						
Cuttings Upon Completion						SS: Split Spoon (ASTM D 1586)						

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SOIL BORING LOG

Boring No. B-5

Page 1 of 1

Project: Lacassine Water Treatment Plant
 Location: LA Highway 101
 Lacassine, Louisiana
 Client: Meyer & Associates, Inc.
 Sulphur, Louisiana

DJH File No: 24-045
 Date Drilled: 12/13/2024
 Logged By: Silas Henrich
 Drilled By: Data Acquisition Services
 Equipment: Ardco Top Drive (Buggy)

Depth (ft)	Field Tests			Laboratory Tests							Symbol	Description
	Sample Type	Penetrometer (tsf) or SPT (bpf)	Ground Water	Qu / UU (tsf)	Dry Density, γ_d (pcf)	Moisture Content, w (%)	Atterberg Limits			Notes / Other Tests		
							Liquid Limit, %	Plastic Limit, %	Plasticity Index, %			
1	ST	2 tsf										Stiff gray & red CLAY (CH), w/ lots of red oxide nodules
2												
3	ST	2 tsf				19	49	21	28			Stiff light gray w/ tan to reddish brown SILTY CLAY (CL), w/ tan & reddish brown oxides & black oxide nodules
4												
5	ST	2 tsf										Stiff light gray w/ tan SILTY CLAY (CL), w/ tan oxides & small black oxide nodules
6												
7	ST	2 tsf				24	53	25	28			Stiff reddish brown w/ gray CLAY (CH); grading to gray w/ tan, w/ black oxides
8												
9	ST	2 tsf										Stiff tan w/ light gray CLAY (CH), w/ tan oxides & light gray silt streaks
10												
11	ST	2½ tsf				27	50	22	28			- ditto, w/ a 1" brown oxide layer
12												
13	ST	2½ tsf										Firm tan w/ light gray SILTY CLAY (CL), w/ tan oxides & gray silt pockets
14												
15												Boring Completed at 15' Depth
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
Boring Data						Ground Water Data					Notes / Other Tests	
Boring Advancement:						★ No Ground Water Encountered					ϵ_f = Failure Strain	
Dry Auger: 0' to 15'												
Rotary Wash: n / a												
Boring Abandonment:						Sample Type:					Soil Stratification is Approximate	
Boring Backfilled w/ Soil						ST: Shelby Tube (ASTM D 1587)						
Cuttings Upon Completion						SS: Split Spoon (ASTM D 1586)						

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SOIL BORING LOG

Boring No. B-6

Page 1 of 1

Project: Lacassine Water Treatment Plant
Location: LA Highway 101
Lacassine, Louisiana
Client: Meyer & Associates, Inc.
Sulphur, Louisiana

DJH File No: 24-045
Date Drilled: 12/13/2024
Logged By: Silas Henrich
Drilled By: Data Acquisition Services
Equipment: Ardco Top Drive (Buggy)

Depth (ft)	Field Tests			Laboratory Tests							Symbol	Description
	Sample Type	Penetrometer (tsf) or SPT (bpf)	Ground Water	Qu / UU (tsf)	Dry Density, γ_d (pcf)	Moisture Content, w (%)	Atterberg Limits			Notes / Other Tests		
							Liquid Limit, %	Plastic Limit, %	Plasticity Index, %			
1	ST	No Test				6	21	18	3			Firm gray fine SANDY SILT (ML), - dry, very poor
2												
3	ST	4½ tsf										Stiff gray w/ tan SILTY CLAY (CL), w/ tan oxides
4												
5	ST	4½ tsf				14	48	24	24			Stiff light gray w/ tan SILTY CLAY (CL), w/ tan & black oxides & gray silt pockets
6												
7	ST	4½ tsf										Stiff light gray w/ tan to reddish brown CLAY (CH), w/ reddish brown & black
8												
9	ST	4½ tsf				9	29	16	13			oxides & light gray silt pockets
10												Stiff light gray w/ tan SANDY CLAY (CL), w/ tan oxides & gray sand pockets
11	ST	2½ tsf										Stiff light gray w/ tan CLAY (CH), w/ tan oxides
12												
13												
14	ST	2 tsf				22	47	22	25			Stiff light gray & tan SILTY CLAY (CL), w/ tan oxides
15												
16												Boring Completed at 15' Depth
17												
18												
19												
20												
21												
22												
23												
24												
25												
Boring Data						Ground Water Data				Notes / Other Tests		
Boring Advancement: Dry Auger: 0' to 15' Rotary Wash: n / a						★ No Ground Water Encountered				ε _f = Failure Strain Soil Stratification is Approximate		
Boring Abandonment: Boring Backfilled w/ Soil Cuttings Upon Completion						Sample Type:						
						ST: Shelby Tube (ASTM D 1587) SS: Split Spoon (ASTM D 1586)						

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SOIL BORING LOG

Boring No. B-7

Page 1 of 1

Project: Lacassine Water Treatment Plant
 Location: LA Highway 101
 Lacassine, Louisiana
 Client: Meyer & Associates, Inc.
 Sulphur, Louisiana

DJH File No: 24-045
 Date Drilled: 12/13/2024
 Logged By: Silas Henrich
 Drilled By: Data Acquisition Services
 Equipment: Ardco Top Drive (Buggy)

Depth (ft)	Field Tests			Laboratory Tests							Symbol	Description
	Sample Type	Penetrometer (tsf) or SPT (bpf)	Ground Water	Qu / UU (tsf)	Dry Density, γ_d (pcf)	Moisture Content, w (%)	Atterberg Limits			Notes / Other Tests		
							Liquid Limit, %	Plastic Limit, %	Plasticity Index, %			
1	ST	1½ tsf									Firm gray CLAYEY SILT (CL-ML), w/ roots - very poor	
2												
3	ST	2½ tsf		1.4	117	21	50	19	31	$\epsilon_f = 7.1\%$		Stiff tan & gray CLAY (CH), w/ tan, reddish brown & black oxides & large dark gray silt streaks - fair
4											Boring Completed at 4' Depth	
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
Boring Data						Ground Water Data					Notes / Other Tests	
Boring Advancement:						★ No Ground Water Encountered					ϵ_f = Failure Strain	
Dry Auger: 0' to 4'												
Rotary Wash: n / a												
Boring Abandonment:						Sample Type:					Soil Stratification is Approximate	
Boring Backfilled w/ Soil						ST: Shelby Tube (ASTM D 1587)						
Cuttings Upon Completion						SS: Split Spoon (ASTM D 1586)						

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SOIL BORING LOG

Boring No. B-8

Page 1 of 1

Project: Lacassine Water Treatment Plant
 Location: LA Highway 101
 Lacassine, Louisiana
 Client: Meyer & Associates, Inc.
 Sulphur, Louisiana

DJH File No: 24-045
 Date Drilled: 12/13/2024
 Logged By: Silas Henrich
 Drilled By: Data Acquisition Services
 Equipment: Ardco Top Drive (Buggy)

Depth (ft)	Field Tests			Laboratory Tests							Symbol	Description
	Sample Type	Penetrometer (tsf) or SPT (bpf)	Ground Water	Qu / UU (tsf)	Dry Density, γ_d (pcf)	Moisture Content, w (%)	Atterberg Limits			Notes / Other Tests		
							Liquid Limit, %	Plastic Limit, %	Plasticity Index, %			
1	ST	2½ tsf		2.1	107	19	52	19	33	$\epsilon_f = 8.6\%$	From Handheld GPS (approximate): N 30° 14.158' W 93° 55.845' Very stiff dark gray w/ tan to red CLAY (CH), w/ tan to red oxides & dark gray silt streaks - fair Stiff light gray & tan SILTY CLAY (CL), w/ large gray silt pockets / streaks Boring Completed at 4' Depth	
2												
3	ST	2 tsf										
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
Boring Data						Ground Water Data				Notes / Other Tests		
Boring Advancement: Dry Auger: 0' to 4' Rotary Wash: n / a						★ No Ground Water Encountered				ϵ_f = Failure Strain Soil Stratification is Approximate		
Boring Abandonment: Boring Backfilled w/ Soil Cuttings Upon Completion						Sample Type:						
						ST: Shelby Tube (ASTM D 1587) SS: Split Spoon (ASTM D 1586)						

SOIL BORING LOG

Boring No. B-9

Page 1 of 1

Project: Lacassine Water Treatment Plant
 Location: LA Highway 101
 Lacassine, Louisiana
 Client: Meyer & Associates, Inc.
 Sulphur, Louisiana

DJH File No: 24-045
 Date Drilled: 12/13/2024
 Logged By: Silas Henrich
 Drilled By: Data Acquisition Services
 Equipment: Ardco Top Drive (Buggy)

Depth (ft)	Field Tests			Laboratory Tests							Symbol	Description
	Sample Type	Penetrometer (tsf) or SPT (bpf)	Ground Water	Qu / UU (tsf)	Dry Density, γ_d (pcf)	Moisture Content, w (%)	Atterberg Limits			Notes / Other Tests		
							Liquid Limit, %	Plastic Limit, %	Plasticity Index, %			
1	ST	2 tsf		1.6	100	24	62	19	43	$\epsilon_f = 10\%$	From Handheld GPS (approximate): N 30° 14.157' W 93° 55.794'	Stiff gray & red CLAY (CH), w/ lots of red oxide nodules
2												
3	ST	4 tsf		2.1	108	19				$\epsilon_f = 10\%$		Very stiff light gray w/ reddish brown CLAY (CH), w/ tan to reddish brown oxides & small black oxide nodules
4											Boring Completed at 4' Depth	
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
Boring Data						Ground Water Data					Notes / Other Tests	
Boring Advancement:						★ No Ground Water Encountered					ϵ_f = Failure Strain	
Dry Auger: 0' to 4'												
Rotary Wash: n / a												
Boring Abandonment:						Sample Type:					Soil Stratification is Approximate	
Boring Backfilled w/ Soil						ST: Shelby Tube (ASTM D 1587)						
Cuttings Upon Completion						SS: Split Spoon (ASTM D 1586)						

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Description of Field and Laboratory Testing Procedures

Field Testing Procedures. The borings were located in the field using the information provided by the client's representative and standard GPS and/or taping procedures from relevant physical features shown on the site plan provided for our use. The borings were (initially) advanced using dry auger methods. Soil samples were obtained continuously in the upper 10 foot and on 5 foot centers thereafter. The sample depths and types are recorded on the soil boring logs.

In general, relatively undisturbed "Shelby" tube samples (ASTM D 1587) were taken in clays and silty clays. Undisturbed soil samples are required for strength and density tests, and other properties that are dependent upon the soil being close to its natural state. In this procedure, the boring is advanced to the desired sampling depth, then a 3 inch diameter, thin-walled "Shelby" tube is inserted into the borehole. The tube is then pushed hydraulically about 2 feet into the undisturbed soil. The tube is withdrawn, and the sample extruded with a hydraulic piston. The sample is visually classified and tested with a spring loaded penetrometer, which provides a crude estimate of the unconfined compressive strength. The penetrometer test result is recorded on the soil boring log, and a representative portion of the sample is secured for transport to the laboratory.

In sands and silts, Standard Penetration Tests (ASTM D 1586) are generally made. This test provides a measure of the in-situ density or stiffness of the soil and provides a relatively disturbed sample that may be used for classification testing. In this procedure, the boring is advanced to the desired sampling depth, and a relatively heavy walled "split spoon" sampler is inserted into the borehole. The sampler is driven into the soil using a 140 pound "drop" hammer with 30 inch strokes. The number of blows required to drive each 6 inch increment is recorded. The first increment is a seating drive; the number of blows required to drive the second and third increments are added together to determine the "N-value," which has units of blows per foot (bpf). The N-value and the number of blows per increment are recorded on the soil boring log. The sample is visually classified, and a representative portion secured for transport to the laboratory.

Laboratory Testing Procedures. Representative samples from the field investigation were selected by the project engineer for laboratory testing to determine their relevant engineering characteristics. These tests generally fall into one of the following categories.

Strength Tests. Strength tests generally consist of the Unconfined Compressive Strength, or Qu Test, (ASTM D 2166), and the Unconsolidated, Undrained Triaxial Compressive Strength, or UU Test, (ASTM D 2850). In each of these tests, a cylindrical sample of undisturbed soil is subjected to an axial load until failure occurs, yielding the compressive strength of the soil. The principal difference between the two tests is that the Qu is not confined laterally, which can lead to premature failure, and thus, lower compressive strength values. The UU test is confined laterally in a triaxial cell, typically to the lateral stress that the in-situ soil sample was subject to. The compressive strength and axial strain at failure (ϵ_f) are recorded on the soil boring log. The confining stress of UU tests is also recorded.

Classification Tests. Common classification tests include the Atterberg Limit Tests and Particle Size Analyses. Atterberg Limit Tests (ASTM D 4318) are performed to determine the consistency (or "clayeyiness") of a soil. The Atterberg limits consist of the Liquid Limit (LL) and the Plastic Limit (PL), and the Plasticity Index (PI), which is the difference between the LL and the PL. These values are recorded on the soil boring log.

The Particle Size Analysis Test (ASTM D 422) is performed to determine the distribution of the individual particle sizes of a soil sample. The test is typically performed using mechanical sieves for soils containing gravel and sands, or a "hydrometer" for clayey and silty soils. The results of the Particle Size Analysis are typically plotted on a log scale.

Physical Tests. Common physical tests include the Moisture Content Test (ASTM D 2216) and the Dry Density Test (ASTM D 7263). As the names indicate, these tests determine the moisture content and dry density (or dry unit weight) of a soil sample.

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TECHNICAL PROVISIONS

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**TECHNICAL PROVISIONS
SECTION 100
GENERAL REQUIREMENTS**

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**TECHNICAL PROVISIONS
SECTION 100
GENERAL REQUIREMENTS**

100-1 PROJECT IDENTIFICATION

100-1.1 OWNER

Jefferson Davis Parish Water & Sewer Commission #1
P.O. Box 515
Lake Arthur, LA 70549
Phone No. 337-587-2276

Contact Person: David Trahan, Manager

100-1.2 ENGINEER

Meyer & Associates, Inc.
600 N. Cities Service Highway
Sulphur, Louisiana 70663
Phone No. (337) 625-8353

Contact Person: Mark McCarty

100-1.3 PROJECT TITLE

Lacassine Water Treatment Plant, Phase 1 – Booster Station
M.A. Project No. A8-23035-DA

100-1.4 SCOPE OF WORK

Contract work includes furnishing all materials, labor, equipment, supervision, tools, and other necessary items for the complete and satisfactory construction of a potable water booster station.

100-2 CONTRACT CONSIDERATIONS

100-2.1 CONTRACT QUANTITY CHANGES

The Owner shall have the right to increase or decrease the amount of work at any time or times provided that the total increase or decrease does not exceed thirty percent (30%) of the original total Contract price shown in the Agreement. The total increase or decrease may be applied to one or any number of items, or any item or items may be completely eliminated. No allowance will be made for any supposed or real loss of anticipated profits on account of such increase or decrease. Contractor is advised to balance the bid carefully.

100-2.2 MATERIALS STORAGE

All material shall be stored in strict accordance with the manufacturer instructions.

The Contractor shall provide a fenced storage site capable of storage of all material ordered if the Contractor is requesting payment for materials stockpiled. Payment for stockpiled

materials will only be made for materials stored on-site as approved and accepted by the Engineer. Material invoices must be provided.

The Contractor shall be fully responsible for all material through the warranty period and beyond as provided by this Contract and applicable law and may desire to retain a certain amount from the Vendor supplying the materials.

100-2.3 PROCEDURE FOR RECORD DRAWING

As a supplement to General Conditions Section 7.12 requirement of the Contractor to maintain record drawings, the Contractor shall maintain and provide the Engineer with record documents as specified herein.

1. Maintenance of Documents

A. Maintain in Contractor's field office in clean, dry legible condition the following:

1. Contract Drawings
2. Specifications
3. Addenda
4. Approved Shop Drawings
5. Change Orders
6. Other modifications of Contract, Test Records, Survey Data, Field Orders, and
7. All other documents pertinent to Contractor's work.

B. Provide files and racks for proper storage and easy access.

C. Make documents available at all times for inspection by the Engineer and the Owner.

D. Record documents shall not be used for any other purpose and shall not be removed from the office without the Engineer's approval.

2. Marking System

A. Use colored pencils for marking changes, revisions, additions, deletions, etc., to the record set of Contract Drawings.

3. Recording

A. Label each document "PROJECT RECORD" in two inch (2") high printed letters.

B. Keep record documents current.

C. Do not permanently conceal any work until required information has been recorded.

D. Contract Drawing - Legibly mark to record actual construction including:

1. Depths of various elements in relation to datum.
2. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
3. Location of internal appurtenances concealed in construction referenced to visible and accessible features of the work.

4. Field changes of dimension and detail.
5. Changes made by Change Order or Field Order.
6. Details not on original Contract Drawings.
- E. Specifications and Addenda - Legibly mark up each Section to record:
 1. Manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed.
 2. Changes made by Change Order or Field Order.
 3. Other matters not originally specified.
- F. Shop Drawings - Maintain as record documents and legibly annotate drawings to record changes made after review.
4. Submittal
 - A. At completion of project, deliver record documents to the Engineer.
 - B. Accompany submittal with transmittal letter containing:
 1. Date;
 2. Project title and number;
 3. Contractor's name and address;
 4. Title and number of each record document;
 5. Certification that each document as submitted is complete and accurate; and
 6. Signature of Contractor, or his authorized representative.
5. Part of Other Work

Record drawings are considered a part of the related work and as such payment for work may be denied or reduced appropriately should the record drawings not be current during any periodic pay estimate period.

100-2.4 PROCEDURES FOR SHOP DRAWINGS

As a supplement to the General Conditions, the following also applies to the shop drawings and their submittal procedure.

To meet the qualifications necessary to ensure approval of a submittal as a Shop Drawing, the submittal must:

- A. Include drawings of the item in a sufficiently large scale so as to provide clarity to allow adequate evaluation of the complete product as it is proposed to be furnished at the job site.
- B. Include specifications and descriptions of the item as it is proposed to be furnished at the job site.
- C. Include drawings of the item showing the physical dimensions of the item, the clearances necessary to install the item.
- D. Include drawings and specifications showing materials of construction, their strengths, the surface preparation, and paint used upon them. The specific grade of surface

preparation shall be specified if it differs from the requirements called for in the Technical Provisions.

- E. Include copies of sample warranties on each item of equipment.
- F. Include specifications describing operation and maintenance requirements for the item.
- G. Include drawings and specifications of special equipment needed for proper installation of the item and whether or not these items are to be furnished by the Supplier/Vendor. A complete set of field assembly and installation instructions for the installation contractor shall be provided as a part of the Certified Shop Drawings.

The Contractor shall submit six (6) copies each of the shop drawings submittal on respective materials, certified and stamped. Uncertified or unstamped submittals may be treated as being incomplete. All submittals must be accompanied with written letter or transmittal signed by an authorized representative of the Contractor. Submittal from other parties will not be accepted. Incomplete submittals will be returned as incomplete with no action taken.

100-2.5 REFERENCE SPECIFICATIONS

The following are hereby designated to be the reference specifications and are made a part of these Contract Documents by reference.

- The Louisiana Department of Transportation & Development Specifications for Roads and Bridges, 2016 Edition Part Nos. 2 thru 10
- Louisiana Sanitary Code for Water Supplies (LAC 51:XII)
- Louisiana Sanitary Code for Sewage Disposal (LAC 51:XIII)
- Recommended Standards for Sewage Works, 1990 Edition

The Technical Specifications contained herein only highlight and supplement certain areas of the reference Specifications; therefore, it shall be the Contractor's responsibility to thoroughly familiarize himself with the referenced specifications. In case of conflict the Technical Specifications contained herein will govern.

100-2.6 SUBSTANTIAL COMPLETION

The procedure for securing the status of "substantially complete" shall be as defined in the General Conditions as modified in this section. Minimum requirements to be met prior to the Work being substantially complete include:

1. Pay item work complete.
2. Record drawings submitted to the Engineer.

100-2.6.1 Equipment Start-up

All equipment shall be given an initial startup under the manufacturer's representative as specified. This start-up by itself does not constitute the commencement of any warranty or operational period.

100-2.6.2 Operational Period

The Contractor, as part of the work, shall start up the facility. Requirements relating to specific equipment appear elsewhere in these specifications.

Generally, the Contractor must have all equipment and controls, capable of full operation prior to performing a facility start up. Partial startups pertaining to isolated equipment shall not constitute a facility start-up.

An Operation Inspection of the project will be required before the facility start up. Therefore, when the work is sufficiently complete, the Contractor shall notify the Engineer in writing and request an operational inspection. The notification shall include a list of items remaining to be completed or corrected.

Within ten (10) working days after the notification, the Engineer will inspect the work and verify the list of items remaining to be completed or corrected.

If the Engineer does not concur that the work is sufficiently complete, he will notify the Contractor in writing and state his reasons. Upon Engineer's concurrence that the work is sufficiently complete, the Contractor shall start up the facility.

After successfully starting the station up and demonstrating it to the Owner and Engineer, the Contractor shall operate and maintain the facility for a period of ten (10) consecutive days. These days shall run without interruption due to failures associated with the new equipment. If failures occur, they shall be promptly remedied, and the facility put back online. The ten (10) days period will then begin anew.

Upon completion of the ten (10) day operational period, the Contractor may turn the daily maintenance of the facility over to the Owner, under the Contractor's supervision. This will not begin any warranty under this Contract. At this time, with Owner's concurrence, the Contractor may demolish/abandon, as specified elsewhere, any existing facility to be abandoned which has been replaced by the newly started facility.

At the time that the operation of the station is turned over to the Owner, the Owner will begin paying for electrical power and lubricants and other daily maintenance items.

100-2.6.3 Work Status

Prior to requesting a substantial completion, all pay item work shall be completed. Minor corrective work shall be acceptable to remain undone.

100-2.6.4 Inspection for Substantial Completion

As a supplement to the General Conditions, an inspection for substantial completion is required.

After completion or correction of all items noted during the operational inspection (including subsequent deficiencies discovered) and completion of stated prerequisites, the Contractor shall notify the Engineer in writing that the work is substantially complete and request an inspection for issuance of substantial completion certificate. The Contractor shall request the inspection in writing to the Engineer.

The Contractor shall submit the following items to the Engineer when requesting the inspection: (1) manufacturer's inspection reports when required in the Technical Specifications; (2) certificate of inspection indicating compliance with the laws, ordinances, codes and regulations of Federal, State and local governmental agencies; and (3) a certificate that the Contractor has carefully inspected the work and found it to be entirely complete and in full compliance with the Contract Documents.

100-3 PRELIMINARY MATTERS

100-3.1 PRECONSTRUCTION CONFERENCE

Prior to beginning construction, a pre-construction conference will be held between the Contractor(s), the Owner, and the Consulting Engineers to reach agreements relating to responsibilities and procedures of each interested party to see that the project is installed according to the approved plans and specifications and the conditions under which disbursements for construction costs are authorized and will be paid. This meeting will be prearranged by the Owner.

100-3.2 CONSTRUCTION SCHEDULE

Prior to the Preconstruction Conference, the Contractor shall prepare and submit to the Engineer a proposed progress schedule in the form of a bar chart showing:

1. Appropriate items of work.
2. The percent of total work for each item of work.
3. Time of beginning and time of completion of each item by calendar period.
4. Other data pertinent to each item (such as total quantity of each, etc.)
5. The bar chart shall be arranged so that actual progress of the work can be charted beside proposed schedule of work for each item.

The form and arrangement of the progress schedule shall be as approved by the Engineer. The breakdown of the work into various items shall be as approved by the Engineer.

The bar chart progress schedule shall be updated monthly by the Contractor to show actual work progress and submitted to the Engineer in quadruplicate, monthly.

When monthly requests for payment are made, the progress schedule shall be attached to the payment request. No requests for payment will be approved unless the monthly submittals are completed.

100-3.3 PERMITS

The Contractor is responsible for all required local permitting and licensing including pulling a building permit, electrical, mechanical, and plumbing permits and obtaining any licenses required for said work. Contractor is responsible for scheduling and coordinating all required inspections.

100-3.4 PROJECT FIELD OFFICE

A project field office for use by others is not required.

100-3.5 PROJECT SIGN

A project sign is not required.

100-4 GENERAL CONSTRUCTION

100-4.1 PROTECTION OF THE SITE

The Contractor shall protect adjacent utilities, equipment, driveways, fences, cargo, automobiles, etc. The Contractor shall replace or compensate the Owner, for any damage he causes to physical property.

100-4.2 PRECONSTRUCTION DOCUMENTATION

The Contractor is responsible for documenting the condition of property and facilities adjacent to the work prior to construction. Contractor shall video and photograph the project area and provide copies of documentation to Engineer. In the event of damage claims to adjacent improvements the submitted documentation will be used for an initial interpretation of events.

100-4.3 MAINTENANCE OF TRAFFIC

The Contractor shall at all times maintain all streets, trenches, driveways, walkways, and ditches in such condition as to minimize inconvenience to the property owners. Operations shall be so conducted as to cause minimum interference with access to the property on the streets under construction. Adequate barricades, warning signs and lights shall be maintained at all times.

100-4.4 EXISTING DRIVEWAY & DRIVEWAY CULVERTS

Under this Contract, construction work may be required for driveways to be excavated, utilized as excavation storage area, etc. Irrespective of the construction use, under all circumstances the Contractor shall restore the surface of the driveway to its original condition including any necessary removal and replacement of existing driveway culverts. The Contractor shall replace existing culverts at no separate pay; he must include the cost of this work in other items.

100-4.5 EXISTING UTILITIES

The work may be located in the vicinity of existing gas, telephone, sewer, water and/or electric lines, and the Contractor shall handle his work in a manner so as not to damage the existing utilities. He shall repair or pay for any repairs for damages done to existing utilities.

100-4.6 EXISTING FENCING & MAILBOXES

Under this Contract, construction work conflicting with existing fences, fence structures, and/or mailboxes may be encountered. It will be the responsibility of the Contractor to remove and replace any and all of such structures that are encountered. The fences and/or mailboxes shall be restored to their original condition. Any removal and replacement of fencing or mailboxes is considered incidental work unless a separate bid item is included for said work in the Bid Form.

100-4.7 SAFETY FENCING

Safety fencing is required around the perimeter of unattended stationary excavations. Stationary excavations are those construction excavations intended to remain open in excess of 4 hours (such as boring entrance and exit pits).

Safety fencing may be a flexible fabric such as geo grid soil reinforcement, etc. Delineating ribbon or surveying tape will not satisfy this requirement. There is no separate pay for this work.

100-4.8 TEMPORARY UTILITIES

The Contractor shall provide all temporary utilities such as electricity and water necessary to test and complete his various items. Should more than one contractor be involved in a project, the contractors shall coordinate with each other for the necessary utilities.

The Owner will pay for any permanent utility meter deposits; however, the Contractor shall be responsible for any utility bills incurred until the facility is turned over to the Owner for use.

100-4.9 FINAL CLEAN-UP

The Contractor will be responsible for cleanup of the work specifically including removal of construction materials and debris; backfilling of trenches, depressions and ruts resulting from the work and general site grading and dress up to restore to the original condition.

The Contractor shall be fully responsible for the overall Final Project Cleanup, including removal of all construction debris and material, final project grading and dress-up, seeding, etc. It is the intent of the final cleanup requirement that all areas subjected to construction will be fine graded and dressed so that they can be easily mowed with a push type residential mower and not pond water.

100-5 SPECIAL CONSTRUCTION ITEMS

100-5.1 PROTECTION OF EXISTING WATER FACILITIES

There shall be no physical connection between a public or private potable water supply system and a sewer, or appurtenance thereto which would permit the passage of any sewage or polluted water into the potable water supply.

Sewer mains and water mains shall be laid in separate trenches. Water mains shall be laid at least 6 feet horizontally from any existing or proposed gravity sewer, manhole, or force main, storm sewer, septic tank, or subsoil treatment plant, when installed in parallel. Crossing water and sewer mains shall have a minimum vertical separation of 18 in.

100-5.2 WATER SUPPLY FOR TESTING

The Owner shall supply the water for construction and testing at no charge to the Contractor.

**TECHNICAL PROVISIONS
SECTION 203
EARTHWORK**

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TECHNICAL PROVISIONS
SECTION 203
EARTHWORK

203-1 GENERAL

203-1.1 SCOPE

The work covered under this section includes clearing, grubbing and stripping, excavation, backfill, embankment, grading and miscellaneous earthwork required for construction or installation of the various components of the project to the lines and grades shown on the Drawings or as otherwise specified. Trenching and backfilling for installation of underground pipelines and utilities, landscaping and the removal of existing surface structures and obstructions are covered under other sections of these specifications.

203-1.2 SUBMITTALS

After receipt of the Notice of Award, the Contractor shall furnish the Engineer a minimum of six (6) sets of submittals detailing the materials to be furnished including testing data. The Engineer shall promptly review this data and return two (2) copies to the Contractor as approved or approved as noted.

203-2 MATERIALS

203-2.1 GENERAL BACKFILL

Material used for general backfill shall, unless otherwise specified, be good sound earth free from waste, rubbish, objectionable organic matter, large rocks, waste concrete or other unstable or unsuitable material.

Excavated material having a P.I. below 22 may be used for general backfill around, but not underneath, foundations, pits, etc. unless otherwise required by the Drawings or Specifications. Material not meeting this specification shall not be used as general backfill but may be used for spoil fill or grading fill outside 25 feet of the structure perimeter unless otherwise called for on the Drawings or in these specifications.

203-2.2 FOUNDATION FILL

Fill material for use beneath all foundations shall be a clean, select fill material free from debris or organic matter. Fill shall be a silty or sandy clay with a Plasticity Index of 12 to 22 and a Liquid Limit of 30 to 42.

203-2.3 TESTING OF MATERIALS

For all off-site borrow, the Contractor shall provide, at his expense, a soils analysis of the borrow for the Engineer's review and approval. A sample of the proposed borrow shall be taken from the actual source and specifically tested for this Project. The physical location of the pit property shall be included on the test report. Along with the testing the results, the Contractor shall also submit a sample to the Engineer for independent testing.

203-3 INSTALLATION

203-3.1 CLEARING, GRUBBING, & STRIPPING

It is the intent of this article to provide for the removal of all trees, brush, bushes, grass, decayed organic matter, stone, rock, rubbish, or debris, and all other objectionable or unsuitable materials below the bottom of proposed building slabs or other structures, below areas on which embankments are to be placed, and below finished grade as shown on the Drawings or as directed by the Engineer. All borrow areas shall also be cleared, grubbed, and stripped before excavation operations begin to ensure that such objectionable and unsuitable materials will not be present in proposed fills and embankments.

Topsoil shall be stripped and stockpiled outside the area of operations for later use in and over areas which are to be replanted and/or landscaped as shown on the Drawings or directed by the Engineer. Excess topsoil materials shall be spread or wasted as approved by the Engineer.

All holes or pits remaining after the grubbing operations shall have the sides broken down or leveled if necessary to flatten out the slopes, refilled with acceptable material, moistened, and properly compacted in layers to a density not less than that of the surrounding soil.

All organic waste materials from clearing and grubbing operations shall be disposed of off-site by the Contractor. Burning shall conform to applicable local and state laws or ordinances and the obtaining of any necessary permits shall be the responsibility of the Contractor. Should burning or burying not be possible or not be permitted by local or state ordinances, the Contractor shall dispose of all waste materials in an approved manner at no extra cost to the Owner.

203-3.2 EXCAVATION

This work consists of the removal, displacement or shaping of earth, rock, and all other surface and sub-surface materials to the extent necessary to permit proper installation or construction of the various components and facilities making up the Project as shown on the Drawings and/or described in the Contract Documents. The obtaining of borrow materials, from on or off-site locations, may also require that excavation procedures be followed.

All excavation under this Contract will be unclassified unless otherwise noted.

Excavations shall be of such dimensions as to permit the proper construction of the work in the manner, shape, and size shown on the Drawings. Wherever the nature of the soil is such as to permit the making of a proper subgrade, the bottom of the excavation shall have the shape and dimensions shown on the Drawings. In such case, machine excavation shall be so controlled as to not cut below grade and final trimming shall be by hand labor. The subgrade so made shall be free from all loose material before concrete is placed.

203-3.3 SUBGRADE PREPARATION

It is the intent of these specifications that the subgrade for all structures be excavated or prepared so as to provide a firm and unyielding foundation, brought to true line and grade, upon which the work may be constructed.

When called for on the Drawings, the use of crushed stone, gravel, granular fill, or other specified material to build a base upon which to lay floor slabs, wall footings, etc., is required. Such base material shall be spread in a uniform layer of such thickness that when thoroughly compacted, trimmed and rolled it will form a base of the thickness and compaction specified on the Drawings.

In case the materials encountered at subgrade elevation are not stable or are otherwise deemed unsatisfactory by the Engineer, the excavation shall be carried to such additional depth as the Engineer may direct. The Contractor shall refill such excavated space to subgrade level with flowable fill or lean concrete as the Engineer may direct.

203-3.4 SHORING & SHEETING

As may be necessary for the safety of workmen and to prevent shifting of material with possible damage to completed or uncompleted structures and attendant delay of the work, excavations shall be properly shored, sheeted, and braced as the nature of the ground may require or prudence dictate. All local, state, and federal ordinances and laws shall be strictly adhered to. Bracing shall be so arranged as not to place any stress or load on portions of completed work until the general construction has proceeded far enough to provide ample strength.

In general, the sheeting and bracing shall be removed as the excavation is backfilled, and in such a manner as to avoid the caving in of the bank or disturbance of adjacent areas of structures. The voids left by the withdrawal of sheeting shall be filled in a manner approved by the Engineer.

Permission of the Engineer shall be obtained before the removal of any sheeting, shoring, or bracing is undertaken. Such permission by the Engineer shall not relieve the Contractor from the responsibility for injury to any structure or to other property or persons resulting from failure to leave such sheeting, shoring, or bracing in place.

203-3.5 REMOVAL OF WATER

The Contractor shall, during the excavation period and as long thereafter as the proper prosecution of the work may require, provide and maintain, in good operating condition, pumping equipment fully adequate in capacity to promptly remove all water entering any excavation or other parts of the work from surface runoff or groundwater sources. All excavations shall be kept dry, and the water pumped or drained from the work shall be disposed of in such a manner as to prevent damage to adjacent property or to other work under construction. Any and all damage, of whatever nature, caused by dewatering the work shall be promptly repaired or remedied by the Contractor at his own expense. This shall include the cleaning and flushing of existing drainage pipes where such are utilized.

203-3.6 SUBGRADE TREATMENT

In the event that the Contractor encounters a moist subgrade, and if approved by the Engineer, rather than remove additional depth of material, the Contractor may be allowed to attempt to treat the subgrade using one of the following methods:

- For wet weather construction, the upper 6 inches of the exposed surface may be treated with 6 to 8% (by volume) lime and recompact to 95% of the maximum dry density as determined by the Standard Proctor Compaction Test (ASTM D 698). The lime treatment operations should be performed using the general guidelines of Louisiana DOTD Standard Specifications for Roads and Bridges, Section 304, Type D treatment.
- Should construction take place during a prolonged period of dry weather, it may be possible to establish a firm base by tilling, drying, and recompact the upper 6 inches of the exposed surface. In this case, the area should then be kept well drained prior to fill placement, and the first lift of fill should be placed expeditiously.

Establishing good site drainage before and during construction will serve to reduce the potential for compaction difficulties.

203-3.7 UNAUTHORIZED OR OVEREXCAVATION

Wherever, through neglect of the Contractor, the excavation is carried beyond or below the lines and grades shown on the Drawings or given by the Engineer, except as specified above, all such excavated space shall be refilled with such material and in such a manner as may be directed by the Engineer so as to ensure the integrity and stability of the affected structure. Beneath all structures, space excavated without authority shall be refilled by the Contractor, at his own expense as directed by the Engineer.

203-3.8 BORROW SITES

Materials excavated from the site may be used for new construction for making necessary fills, backfills and/or embankments if they meet the prescribed requirements. The quantities generated from these excavations may not be significant, therefore satisfactory materials must be obtained from borrow sources off the site and transported to the location and used.

If a borrow source is not defined on the Drawings, it will be the Contractor's responsibility to locate such a source and arrange with the landowner(s) to obtain the required amounts of borrow material. Permission shall be obtained in writing and the site will be subject to approval by the Engineer.

In general, procedures shall follow those described for clearing and grubbing, and for excavation. Provisions for drainage by gravity shall be made wherever practicable, and the borrow pit shall be kept as dry as is feasible by pumping until borrow operations are complete.

The borrow site shall be graded, dressed, and trimmed to present a neat, sightly condition when borrow operations are completed.

203-3.9 BACKFILLING

Excavations shall be backfilled to the elevations shown on the Drawings, to original ground level, or to such other grades as the Engineer may direct. The time elapsing before backfilling is begun shall be subject to the Engineer's approval. All backfilling shall be carried along in an orderly and expeditious manner.

Before backfilling around structures, all lumber, rubbish, braces, and refuse shall be removed from the excavation and disposed of in a manner satisfactory to the Engineer.

It is essential that the backfill around structures be so placed, compacted, and built up in such a manner as to avoid imposing undue and unbalanced loads on the structure, and to avoid future settlement. To this end, care shall be exercised in selecting backfill material free from large hard clay lumps, especially in cramped areas directly adjoining the walls of structures.

203-3.10 EMBANKMENTS

Areas on which embankments are to be placed shall be cleared, grubbed, and stripped as described previously in this section. Those areas shall then be plowed or scarified to provide a positive bond or "key" between the existing ground and the embankment materials. When compaction is completed, embankments and fills shall be shaped by approved methods and equipment to sections and elevations shown on the Drawings.

203-3.11 PLACEMENT OF FILL

The fills for foundations under structures or paving and backfill around structures shall be brought up in horizontal layers of uniform thickness. Each such layer shall not be more than 6 inches in depth when measured loose and each layer shall be thoroughly compacted to the specified density prior to placement of additional fills and/or backfill material. As may be necessary to attain maximum compaction, the fill and backfill material moisture content shall be reduced or increased as necessary to attain optimum moisture content. After placing, each layer of backfill shall be thoroughly and uniformly compacted by means of mechanical tampers or small impact type tamping rollers. The compacting equipment and the manner of its use shall be subject to the approval of the Engineer.

Unless otherwise shown on the Drawings, densities of compacted backfill shall be not less than the following, when tested in accordance with ASTM D 698:

- Adjacent to new structures - 90%
- Under new pavement - 95%
- Under new structures - 98%

When compaction is completed, embankments and fills shall be shaped by approved methods and equipment to sections and elevations shown on the Drawings.

203-3.12 GRADING

Site grading shall be performed to raise, lower, or shape the existing ground to the lines, grades and sections shown on the Drawings or as may be directed by the Engineer to balance quantities or to enhance drainage. It shall be scheduled so that when completed any further operations performed by the Contractor will not disturb the finished grades.

Topsoil from the stockpile shall be spread in 6-inch layers over areas which are to be seeded and planted.

203-3.13 TESTING

Unless noted otherwise, compaction testing during construction will be coordinated by and paid for by the Owner.

203-3.14 DISPOSAL OF MATERIAL

Surplus excavated material, in excess of that required for backfilling and site grading as shown on the Drawings, shall be disposed of off-site by the Contractor.

203-4 MEASUREMENT & PAYMENT

Unless specifically listed in the Bid Form, separate payment will not be made for the materials and works described in this section. Their cost will be included in the particular unit or lump sum prices in the Bid Form to which they most nearly relate.

**TECHNICAL PROVISIONS
SECTION 205
TRENCH EXCAVATION, EMBEDMENT, & BACKFILL
FOR INSTALLATION OF UNDERGROUND PIPE**

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TECHNICAL PROVISIONS
SECTION 205
TRENCH EXCAVATION, EMBEDMENT, & BACKFILL
FOR INSTALLATION OF UNDERGROUND PIPE

205-1 GENERAL

205-1.1 SCOPE

The Work covered by this section includes furnishing all labor, materials, tools and equipment and performing all operations in connection with clearing, grubbing, stripping, excavating, trenching, and backfilling, for gravity sewers and force mains to be installed in open cut, including all appurtenant structures in accordance with the Plans and Specifications. The General Conditions and Supplementary Conditions shall apply to all Work included under this section.

This Work shall include, but not be limited to the necessary clearing, grubbing, and preparation of the pipeline route or site; the removal and disposal of all debris; excavation and trenching as required; the handling, storage, transportation, and disposal of all excavated material; the sheeting, shoring, and protection work; the preparation of subgrades; the removal of accumulated or round water in the excavation by pumping, well pointing, or other approved method at no extra cost; the protection of adjacent property; backfilling, pipe embedment, fills and embankments; resurfacing and grading; and other appurtenant work. Excavation shall be made in accordance with the lines and grades as shown on the Drawings and/or as staked by the Engineer and as herein specified.

205-2 MATERIALS

205-2.1 EMBEDMENT

Embedment material both below and above the bottom of the pipe, classes of embedment used, and placement and compaction of embedment materials shall conform to the requirements shown on the Drawings, and to the following additional requirements:

Embedment for gravity piping shall be #89 limestone. Contractor must submit material shop drawings for the embedment for approval by the Engineer.

Embedment for pressure piping may be the native material removed during excavation if approved by the Engineer. Native material suitable for embedment must be granular in nature, free of chunks of clay or debris. If the native material is determined to be unsuitable for embedment, embedment material as specified above for gravity piping shall be used at no additional cost to the Owner.

205-3 CONSTRUCTION

205-3.1 SAFETY

The Contractor shall carry out operations under this section in strict accordance with all applicable OSHA Standards. Particular attention is drawn to those safety requirements involving work within excavations and entry into a confined space. It shall be the Contractor's responsibility to comply with OSHA Standards and Regulations pertaining to all aspects of the work. Contractor shall take all safety measures necessary to protect the public from open excavations.

Prior to entering access areas such as manholes, and performing inspection or cleaning operations, an evaluation of the atmosphere to determine the presence of toxic or flammable vapors or lack of oxygen must be undertaken in accordance with local, state, or federal safety regulations.

205-3.2 CLEARING, GRUBBING, & STRIPPING

All vegetation such as trees, stumps, brush, heavy sods, heavy growth of grass, decayed vegetable matter, rubbish and any other unsuitable material within the pipeline route shall be stripped or otherwise removed before excavation is started, and shall be disposed of at no extra cost, unless a separate item for clearing and grubbing is included in the Bid Form.

205-3.3 EXCAVATION

The Contractor shall perform all excavation of every description and of whatever substances encountered, to the depths indicated on the Drawings or as otherwise specified. During excavation, materials suitable for backfilling shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins. All excavated material not required or suitable for backfill shall be removed from the site of the work and disposed of as directed by surplus and unsuitable materials. Separate payment will not be made for such disposition. Such grading shall be done as may be necessary to prevent surface water from flowing into trenches or other excavations, and any water accumulating therein shall be removed by pumping, well pointing or by other approved methods. Such sheeting and shoring shall be done as may be necessary for the protection of the work and for the safety of personnel. Earth excavation shall comprise all materials not otherwise classified and shall include clay, silt, muck, gravel, hardpan, loose stone in masses.

205-3.4 TRENCH EXCAVATION

Trenches shall be of necessary width for the proper laying of the pipe, and the banks shall be as nearly vertical as practicable. The bottom of the trenches shall be accurately graded in accordance with the requirements shown on the Standard Details Drawing. Granular embedment shall be spread and the surface graded to provide a uniform and continuous support beneath the pipe at all points between pipe joints. Bell holes and depressions for joints shall be dug after the granular embedment has been graded and compacted and, in order that the pipe rest upon the prepared bottom for as nearly its full length as practicable, shall be only of such length, depth and width as is required for properly making the particular type of joint. It will be permissible to slightly disturb the finished subgrade by withdrawal of pipe slings or other lifting tackle. After each pipe is laid, true to line and grade granular

embedment shall be deposited and compacted uniformly and simultaneously around the pipe per Standard Details Drawing.

Care shall be taken not to excavate below the depths indicated. Unauthorized over-depths shall be backfilled with granular embedment, as directed by the Engineer and at the expense of the Contractor. Whenever wet or otherwise unstable soil that is incapable of properly supporting the pipe, as determined by the Engineer, is encountered in the bottom of the trench, such soil shall be removed to the depth required and the trench backfilled to the proper grade with foundation material. The Contractor shall receive payment for such authorized extra depth at the unit price bid set forth in the Bid Form under "Foundation Material".

The minimum width of the trench from 24 inches above the top of the pipe to 12 inches below the bottom of the pipe shall be 18 inches plus the outside diameter of the pipe. The width of the trench above that level may be as wide as necessary for sheeting and bracing and the proper performance of the work. The maximum trench widths from 24 inches above the top of the pipe to 12 inches below the bottom of the pipe shall be 24 inches plus the outside diameter of the pipe. If, for any reason, the width of the trench from 24 inches above the top of the pipe to 12 inches below the bottom of the pipe exceeds the maximum width of 24" plus the outside diameter of the pipe, either pipe of adequate strength, special pipe embedment, or concrete arch encasement, as required by loading conditions and as determined by the Engineer, shall be furnished and installed at the expense of the Contractor.

Mechanical equipment used for trench excavation shall be of a type, design and construction, and shall be so operated, that the rough trench bottom elevation can be controlled, that uniform trench widths and vertical sidewalls are obtained at least from an elevation of one foot above the top of the installed pipe to the bottom of the trench and that trench alignment is such that pipe when accurately laid to specified alignment will be centered in the trench with adequate clearance between the pipe and sidewalls.

The trench shall be dug only so far in advance of the pipe laying as the Engineer shall permit. Unless special permission is given by the Engineer, pipe shall be laid, backfilled and tamped immediately behind ditching operations and no trench shall be left open overnight ahead of pipe laying operations.

Rock boulders, large stones, buried trees or stumps shall be removed at least six inches below and on each side of all parts of the pipe, manholes, or other structures. Excavation below subgrade in rock or boulders shall be refilled to subgrade with approved material thoroughly compacted.

Excavation for manhole or other structures shall be such as to give sufficient clearance for the construction of forms, for the inspection of the form exteriors, and to permit draining accumulated water to pump sumps outside of the forms. Any sheeting or well pointing required for excavation of structures shall be considered in the unit price of the structure and no extra pay allowance will be made. Any over-depth excavated below such appurtenances that has not been directed by the Engineer shall be filled with gravel or concrete at the Contractor's expense. Authorized over-depth as directed by the Engineer shall be paid for at the unit price bid set forth in the Bid Form.

205-3.5 CONFLICTS WITH SURFACE OBSTRUCTIONS

The Contractor shall shore up and otherwise protect any buildings or structures which may be endangered during the Work and shall restore to the same condition as existed previous to his work, all bridges, buildings, sheds, fences, walls, or other properties disturbed or damaged by or through his work, all without direct compensation therefor.

The Contractor shall be responsible for all poles, posts, gallery supports, or any other structures or objects existing along the line of his work, shoring up or supporting them when necessary, and shall repair and make good any damage caused thereto by his work. All bridges, bridge plates, crossing stones, etc., destroyed or disturbed in the execution of the Contract shall be properly replaced by the Contractor as part of his obligations under the Contract.

205-3.6 CONFLICTS WITH SUBSURFACE OBSTRUCTIONS

Care must be taken not to injure any gas or water pipe, sewer, drain or service pipes connected therewith or conduits or other underground structures, and the Contractor must repair or have repaired at once, at his own cost, any public or private structure damaged by or in the course of his work. Should the Contractor fail to repair such damage or injury within a reasonable time, the Owner may, after twenty-four (24) hours written notice, have such repairs made and deduct the cost thereof from any amounts due or to become due the Contractor.

The Contractor shall take all risks and be responsible for all expense and damage attending the presence or proximity of any gas or water pipes, sewers, drains, conduits, or other underground structures where such pipes or other structures cross the trench or appear in the trench in such a manner as not to demand their rearrangement or realignment also of all such structures as are approximately parallel with or adjacent to but outside of said trench.

Should the location or position of any gas or water pipe, sewer, drain, conduit, or other obstruction within the limits of the trench be such, in the opinion of the Resident Engineer, as to require removal, realignment or change in order that the work may proceed according to Plans, such removal, realignment or change shall be without expense to the Contractor. When, however, such gas, water pipe, or other construction shall come within the limits of the excavation for the work as located by the Resident Engineer, such pipe, conduit, or other obstruction shall be stripped or uncovered by the Contractor, at his own expense, as constituting a part of his work in excavating. No claim for damages or extra compensation shall accrue to the Contractor from the presence of such pipe or other obstruction or from any delay due to its removal or rearrangement.

In case any pipe or other obstruction so located as to interfere with the Work is unexpectedly encountered, the Contractor shall at once notify the Resident Engineer of the locality and circumstances and the place shall be passed over until satisfactory arrangements are made, without any claim for damages arising from the delay.

The Resident Engineer will in all cases be the judge of the necessity or expediency of any change or rearrangement of any underground structures which may interfere with the construction of the Work under this Contract.

205-3.7 CROSSINGS

No additional compensation will be paid for the construction of any sewer because of its crossing under or over a drainage canal (either open or covered), a natural or artificial stream or lagoon, a railroad track, or a sewer, a culvert, a pipe, a conduit or any such structure provided the route of the sewer as bid on has not been changed so as to produce a crossing not to be anticipated by the bidder. Any additional material required because of the crossing will be paid for at the prices bid for such material.

The average depth of a sewer crossing under a waterway or an open canal will be calculated below a straight line joining the natural (not super-elevated) surface on both banks; the average depth under a closed canal or a track will be calculated below the actual round surface. A dry excavation or depression not in use as a canal or waterway will not be regarded as a canal, the actual ground surface will be used in calculating the depth of the sewer.

Special crossings for which Drawings have been made and on which a special price has been asked, whether a lump sum bid or otherwise, will be paid for according to the special specifications governing said crossings.

Such natural or artificial streams or lagoons, drainages, or navigation canals, gutters, or culverts, shall not be reasonably blocked or obstructed or prevented from carrying their customary drainage or traffic and shall be replaced by the Contractor in as good condition as they were originally, without charge.

The Contractor shall be responsible for any damage of any kind resulting from interference with or obstruction of any drainage canal or other waterway.

205-3.8 HANDLING & DISPOSAL OF WATER

The Contractor shall pump, bail, well point, or otherwise remove any water which may be found or may accumulate in the excavations, and shall perform all work necessary to keep them clear of water while the work is in progress. The cost of removing water by pumping shall be included in the prices bid for the various items of the work; it will not be paid for as a separate pay item.

The Contractor must use vigilance and care so that no water originating on his work or due to his work or which he is obligated to handle and dispose of under his Contract shall discharge or be discharged upon the work or into the trenches of another contract unless by mutual agreement of parties affected. Should any dispute or disagreement arise from this cause, the matter shall be referred to the Resident Engineer for final settlement. Nothing in this Section is to be construed as preventing the reasonable use by any Contractor of any ditch, canal or gutter which is designed and used for drainage.

Gutters or drains parallel with the trench must be maintained unobstructed. When necessary, a proper platform shall be built over them and the excavated dirt placed thereon so as to permit the free passage of all drainage water.

The Contractor shall keep the completed sewer lines free of water at all times. As many pumps as may be necessary shall be kept in operation at the lower end of each section of the work to maintain this condition.

205-3.9 SHEETING & BRACING

Wherever necessary for protection of workmen, for security of adjacent utilities or structures, for stability of trench, or for proper installation and operation of sewer pipe, the Contractor shall ensure that the excavation be braced and rendered secure, to the extent of requiring close sheeting, or sheet piling and suitable bracing, including all nails, spikes and other fastenings. A steel trench box supplemented with additional sheeting may be used in lieu of total sheeting and bracing.

When, in the judgement of the Resident Engineer, removal of sheeting or bracing is likely to cause damage to pavement or property, the Resident Engineer may order such sheeting and bracing as he considers necessary left in place. Neither the giving of such orders by the Resident Engineer, nor his failure or refusal to issue such orders, shall in any way relieve the Contractor of responsibility for damages to pavement or buildings.

Where pipe, conduit or other structures come within the limits of the trench, such pipe or structures shall be supported properly to the satisfaction of the Resident Engineer.

The Contractor will be paid by separate pay item for all sheeting and bracing left in place at the written direction of the Resident Engineer. The cost of all sheeting and bracing not required by the Resident Engineer to be left in place shall be included in the price bid for sewers of each size and depth, and the Contractor will receive no additional compensation therefore.

Where the sheeting for a pipe sewer is driven no lower than the top of the pipe, such sheeting may be withdrawn provided that no sheeting is withdrawn until the trench has been refilled as hereinafter provided to a point not less than two feet (2') above the top of the sewer.

205-3.10 PLACEMENT OF EMBEDMENT

The Contractor shall furnish and install embedment material a minimum of 4" below the piping, the pipe haunching, and a minimum of 6" above the pipe or as shown on the detail Drawings. Contractor shall carefully place the embedment using equipment and appurtenances as necessary to prevent direct dumping of the embedment on the pipe during backfilling within the pipe zone. Embedment shall be shovel sliced under the haunches of the pipe to fill all voids. When placing embedment within the pipe zone, special care shall be exercised to not cause settlement or lateral movement of the pipe.

205-3.11 BACKFILLING

All backfilling shall be as specified herein. The trenches shall not be backfilled until the utilities as installed conform to the requirements specified in the sections covering the installation of the various utilities unless otherwise directed.

After placement and compaction of the granular embedment, the trenches shall be carefully backfilled using finely divided, job excavated material free from debris, organic material, and stones. Care shall be taken in the placement and compaction of the backfill material to not disturb the line or grade of the installed utilities. The remainder of the backfill material shall then be placed in the trench in 8" layers (maximum) and tamped to a density at least equal that of the surrounding earth.

Settling the backfill with water will be permitted under certain circumstances, and will be a requirement when so directed by the Engineer. Any trenches improperly backfilled, or where settlement occurs, shall be reopened to depth required for proper compaction, then refilled and compacted, with the surface restored to the required grade and compaction, mounded over, and smoothed off.

Backfill under roads shall be placed in 6" loose lifts and compact to 95% standard density. Surfaces not directly over the trench, where disturbed as a result of the Work under this Contract, shall be restored to their original condition at the expense of the Contractor. Along all other portions of the trenches, the ground shall be graded to a reasonable uniformity and the mounding over the trenches left in a uniform and neat condition to the satisfaction of the Engineer.

Backfill for manholes and other structures shall be deposited in 6-inch layers, and each layer shall be moistened and compacted to a density of at least equal to that of the surrounding earth or 95% standard density if within roadway or other paved area.

The Contractor shall be responsible for all settlement of backfill, fills, and embankments which may occur within one year after final completion of the Contract under which the work was performed.

205-3.12 SURPLUS & UNSUITABLE MATERIALS

Materials unsuitable for use in the Work and surplus materials not required in the Project shall be disposed of at a location off the Project with the written permission of the property owner on whose property the materials and debris are placed. The Contractor shall make all necessary arrangements with property owners for obtaining suitable disposal areas. After surplus and unsuitable materials have been placed therein, spoil areas shall be cleared of debris, sloped to drain, and graded to present a satisfactory appearance.

Burning, if permitted by authorities, shall be done in accordance with applicable laws or ordinances. If material is to be burned, it shall be burned under the constant care of competent watchmen at all times and in such a manner that anything designated to remain on the Project, the surrounding forest cover, or other adjacent property will not be jeopardized. It shall be the responsibility of the Contractor to determine if burning is permitted and to obtain necessary permits for burning, if permitted by appropriate authorities.

205-4 MEASUREMENT AND PAYMENT

Separate measurement and payment will not be made for the Work described in this section of the Specifications.

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**TECHNICAL PROVISIONS
SECTION 206
STORM WATER POLLUTION PREVENTION PLAN**

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TECHNICAL PROVISIONS
SECTION 206
STORM WATER POLLUTION PREVENTION PLAN

206-1 GENERAL

206-1.1 SCOPE

This Section includes preparation and implementation of a storm water pollution prevention plan (SWPPP) for LDEQ and/or storm water management plan for local permitting. In addition to preparing the Plan(s), the Contractor shall also be responsible implementing the Plan(s) for the management of storm water leaving the Site until final stabilization of the Site.

206-1.2 QUALIFICATIONS

SWPPP's shall be prepared in accordance with good engineering practice by personnel who have been trained in the preparation of SWPPP's.

206-1.3 REFERENCE STANDARDS

- A. LDEQ General Permit for Discharges of Storm Water from Construction Activities Five (5) Acres or More (LAR100000).
- B. LDEQ Storm Water General Permit for Small Construction Activities (LAR200000).

206-1.4 SUBMITTALS

The Contractor is responsible for making all required submittals to LDEQ and/or local authorities, as applicable. Copies of all submittals shall be provided to both the Engineer and Owner.

206-2 MATERIALS

206-2.1 GENERAL

Materials used for implementation of the SWPPP such as silt fencing, hay bales, etc., shall conform to the specifications within the LA DOTD Standard Specifications for Roads and Bridges.

206-3 INSTALLATION

206-3.1 SWPPP PREPARATION

For construction activities with a ground disturbance equal to or greater than 5 AC the Contractor shall prepare a SWPPP in accordance with the requirements of LDEQ LPDES permit LAR100000. The Contractor shall pay all required annual maintenance and surveillance fees and shall submit the required NOI to LDEQ a minimum of 48 hours prior to the commencement of construction activities. The SWPPP must be completed and implemented prior to commencement of construction activities.

For construction activities with a ground disturbance equal to or greater than 1 AC, but less than 5 AC, the Contractor shall prepare a SWPPP in accordance with the requirements of LDEQ LPDES permit LAR200000. The SWPPP must be completed and implemented prior to commencement of construction activities.

Execute the Plan's certification statement before performing any service identified in the Plan and have a statement from all subcontractors stating that they will abide by the requirements of the SWPPP.

The SWPPP shall be amended as necessary to be kept current.

206-3.2 LOCAL PERMITTING

For all construction activities, including those with a ground disturbance less than 1 AC, the Contractor shall be responsible for submitting any required local (municipal or parish) storm water permits. Contractor shall pay all permit fees. Contractor shall develop a storm water management plan as required for the local permit. Contractor shall coordinate all required inspections

206-3.3 IMPLEMENTATION

The Contractor is responsible for the management of storm water runoff from the site in accordance with the SWPPP and/or local permit storm water management plan. The Contractor is responsible for supplying, installing, and paying for all products or materials that will be needed to control storm water runoff in accordance with the Plan(s).

Provide day-to-day on-site implementation of the Plan(s). Provide inspections and generate inspection reports in accordance with the requirements of the applicable LDEQ or local permit. Post and display a copy of the SWPPP, NOI, or other indication that storm water discharges from site are approved under NPDES permit and a brief description of the work being performed under the Contract. Information shall be posted at the site in a prominent place for public viewing.

Submit Notice of Extension (NOE) and pay additional maintenance and surveillance fees, if required. Retain records in accordance with permit requirements.

206-3.4 COMPLETION REPORT

For construction activities with a ground disturbance equal to or greater than 5 AC the Contractor shall submit a Notice of Termination (NOT) in accordance with the requirements of LDEQ LPDES permit LAR100000.

For construction activities with a ground disturbance equal to or greater than 1 AC, but less than 5 AC, the Contractor shall submit a Small Construction Activity Completion Report to LDEQ in accordance with the requirements of LDEQ LPDES permit LAR200000.

206-4 MEASUREMENT & PAYMENT

When listed separately in the Bid Form, items will be measured and paid as a separate unit or lump sum price. When no separate item is listed in the Bid Form, no separate measurement shall be made. The cost of Work not listed separately in the Bid Form shall be included in

another item(s) to which it most nearly relates. Contractor's prices shall include all necessary costs to complete the Work in accordance with the Plans and Specifications.

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**TECHNICAL PROVISIONS
SECTION 401
AGGREGATE SURFACE COURSE**

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TECHNICAL PROVISIONS
SECTION 401
AGGREGATE SURFACE COURSE

401-1 GENERAL

401-1.1 SCOPE

This work consists of constructing a limestone surface course for roadway, shoulders or driveway entrances in accordance with these specifications, and in reasonably close conformity with the lines, grades, thicknesses and typical sections shown on the plans or established by the Engineer.

401-1.2 SUBMITTALS

After receipt of the Notice of Award, the Contractor shall furnish the Engineer a minimum of six (6) sets of submittals detailing the materials to be furnished including testing data. The Engineer shall promptly review this data and return two (2) copies to the Contractor as approved or approved as noted.

401-2 MATERIALS

401-2.1 STONE

Aggregate surface course stone shall be #57 grey limestone conforming to the following gradation:

<u>U.S. Sieve</u>	<u>% Passing</u>
1½"	100%
1"	95-100%
½"	25-60%
#4	0-10%
#8	0-5%

401-2.2 GEOTEXTILE FABRIC

Limestone shall be placed on an approved non-woven geotextile fabric, Propex Geotex 601, Mirafi 160N, or approved equal, on a prepared subgrade that has been approved by the Engineer. Geotextile fabric shall meet the following minimum requirements:

- Min. grab tensile strength 160 lbs.
- Min. % elongation at failure 50%
- Min. CBR puncture 410 lbs.
- Min. trapezoidal tear 60 lbs.
- Max. AOS 70 US Std. Sieve

401-3 INSTALLATION

401-3.1 PLACING LIMESTONE

The limestone shall be deposited directly on the geotextile fabric and subgrade from vehicles used for hauling or from spreading equipment. No surface course shall be placed on a muddy or rutted subgrade.

Limestone surfacing materials shall not be placed or spread on Portland cement concrete or asphaltic concrete pavements, and limestone surfacing operations shall be conducted in such manner that pavement surface, edges and joints are not damaged.

401-3.2 SHAPING & COMPACTING

The limestone shall be shaped by suitable means while being compacted. Shaping and compacting shall continue until the surface reasonably conforms to the cross sections shown on the Drawings and until it is free from ruts and waves. Ruts shall be repaired by placement of additional stone and not by blading.

The limestone shall be compacted by a minimum of 12 passes of a 5,000-pound sheepsfoot roller with a single 3-foot to 4-foot diameter drum, or other approved method of compaction. Compaction shall continue until no deflection is visible. Upon completion of the required number of passes with the compaction equipment, the surface will be wetted as necessary and rolled with a pneumatic-tire roller or steel roller to insure a tight, uniform surface.

On shoulders less than 5 feet wide and ramps, the limestone shall be wetted as necessary, shaped to the required section, and uniformly compacted with suitable compaction equipment until a tight, uniform surface is obtained.

401-4 MEASUREMENT & PAYMENT

Unless specifically listed in the Bid Form, separate payment will not be made for the materials and works described in this section. Their cost will be included in the particular unit or lump sum prices in the Bid Form to which they most nearly relate.

401-4.1 DIMENSIONAL TOLERANCES

When net section measurement is specified, the thickness and width of completed limestone surface course will be checked for determining acceptance in accordance with DOTD Designation: TR 602. Areas with thickness and width deficiencies in excess of the following tolerances shall be corrected to plan dimensions by furnishing, placing, shaping, and compacting additional materials as required at the contractor's expense.

(a) Thickness: Under-thickness shall not exceed 3/4 inch. Over-thickness will be waived at no additional cost to the Owner.

(b) Width: Under-width on roadways shall not exceed 6 inches. Under-width on shoulders shall not exceed 3 inches. Over-width will be waived at no additional cost to the Owner.

401-4.2 VEHICULAR MEASUREMENT BY VOLUME

When vehicular measurement by volume is specified, limestone will be measured at the point of delivery by the CY in approved hauling vehicles. Materials delivered by volume will be measured by the CY and divided by 1.30 to determine pay volume.

401-4.3 VEHICULAR MEASUREMENT BY WEIGHT

When vehicular measurement by weight is specified, limestone will be measured by weight in tons. Contractor shall provide hauling tickets. Weight in tons will be divided by 1.95 to determine pay volume per CY.

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**TECHNICAL PROVISIONS
SECTION 705
CHAIN LINK FENCING**

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TECHNICAL PROVISIONS
SECTION 705
CHAIN LINK FENCING

705-1 GENERAL

705-1.1 SCOPE

Under this section of the Specifications, the Contractor shall construct fences and gates in accordance with these specifications and in conformity with the lines and grades shown on the Drawings and/or established by the Engineer.

The same type of chain link fencing and privacy slats shall be used throughout the Project. The same type, shape and treatment of posts shall be used throughout a section of fence.

705-1.2 SHOP DRAWINGS

After receipt of the Notice of Award, the Contractor shall furnish the Engineer a PDF of shop drawings from the manufacturer detailing the equipment or products to be furnished including dimensional data and materials of construction. The Engineer shall promptly review this data and return to the Contractor as approved, approved as noted, or rejected. Upon receipt of accepted shop drawings, the manufacturer shall proceed with order entry of the products and/or fabrication of the equipment.

705-2 MATERIALS

705-2.1 FENCING

Fencing shall be a chain link fence with steel posts set in concrete, and all corners, gates and gate posts as required by the Drawings and as stipulated herein. Fencing shall conform to the requirements of Federal Specification RR-F-191 for Type 1 Grade A fencing. Structural steel shapes, plates and bars shall be hot-dipped galvanized. Welded members shall be galvanized after welding. Height of fencing shall be as shown on the Drawings.

705-2.2 PIPE

Pipe for posts, rails, and bracing shall be Schedule 40 steel pipe conforming to ASTM A53. Pipe shall have a minimum yield strength of 30,000 psi. All pipe shall be hot-dipped galvanized with a minimum zinc coating weight of 1.8 oz/ft² determined in accordance with ASTM A90/A90M.

705-2.3 FABRIC

Fabric shall be of No. 9 gage copper bearing open hearth steel wire, woven in a two-inch (2") mesh, and shall be galvanized by the hot-dip process after weaving. Fabric shall be built into the gate frame by means of stretcher bars and adjustable bolt hooks. Along the bottom of the fence, between posts, the fabric shall be fastened by ties to a tension wire of 9 gage, minimum, galvanized coil spring steel of good commercial quality. The top edge of the wire fabric shall be smooth with no barbs permitted. The bottom edge shall have a twisted and barbed salvage. Fabric shall be attached to, and supported by terminal and gate posts by

means of 3/4" x 1/4" hot-dipped galvanized tension bars, secured to the posts by means of heavy galvanized fittings.

705-2.4 POSTS

All posts shall be of such length that they may be embedded in concrete foundations to a depth of not less than 36 inches. All posts shall be fitted with watertight, malleable iron caps. Posts shall be of the following minimum dimensions:

- Line Posts - All line posts shall be 2.375 inch O.D. round hot rolled steel (weight not less than 3.65 pounds per linear foot.)
- Terminal Post & Swing Gate Posts (for single gates 6' or less in width) - End, corner, angle and pull posts shall be of four-inch (4") O.D. steel pipe weighing not less than 9.10 pounds per linear foot.
- Swing Gate Posts (for single gates exceeding 6' in width) - 6.625 inch O.D. steel pipe, weighing not less than 18.97 pounds per linear foot, shall be used for gate posts.

705-2.5 GATES

Gates shall be furnished and installed as shown on the Drawings. Gates shall be fabricated by the manufacturer of the fence in which they are installed. Hinges shall be of heavy malleable iron, hot-dipped galvanized. Bottom hinges shall be of the ball and socket type, arranged for padlock locking. Gates shall be constructed entirely of not less than 2 inch O.D. pipe weighing 2.72 pounds per linear foot. Fabric for the gates shall be the same as specified for the fence.

Gates of a different design from that shown on the plans may be furnished with prior approval. Gates shall be of rigid construction, and after erection shall not show sag or warp. The maximum allowable width for a single swing gate is 13'. If required, the gates shall be equipped with a bottom roller for ease of opening.

705-2.6 RAILS & BRACING

All top rails shall be 1-5/8 inch O.D. steel pipe, weighing not less than 2.27 pounds per linear foot. The top rail shall pass through the bases of the top caps and form a continuous brace from end to end of each stretch of fence. Top rails shall be provided with expansion rail couplings and shall be securely fastened to gate and terminal posts by means of suitable hot-dipped galvanized connections.

All end, gate, corner, and angle post shall be suitable braced by means of 1 5/8" O.D. steel pipe weighing not less than 2.27 lbs. per linear foot, set in horizontal position, with adjustable truss braces, of not less than 1/2" tots and turnbuckles, between terminal and first line posts, complete with all fittings hot-dipped galvanized. Terminal posts shall be braced by means of 1-5/8" O.D. steel pipe weighing not less than 2.27 lbs. per linear foot, set in horizontal position, with adjustable truss braces, of not less than 1/2" tots and turnbuckles, between terminal and first line posts, complete with all fittings hot-dipped galvanized. Terminal posts shall be braced laterally in an approved manner. Swing gates shall be provided with auxiliary side braces where necessary.

705-2.7 BARBED WIRE

Barbed wire (if required) shall consist of three (3) strands of 12½ gage wire with 14 gage 4 point barbs spaced approximately five inches (5") apart. All wire shall be zinc coated with a

minimum coating of 0.80 oz/ft² of surface area on 12 1/2 gage wire and 0.60 oz/ft² of surface area on 14 gage wire.

705-2.8 PRIVACY SLATS

Privacy slats (if required) shall be of extruded high-density polyethylene, color pigment, and UV inhibitors specifically designed to withstand the harmful effects of the sun.

705-3 **INSTALLATION**

705-3.1 GENERAL CONSTRUCTION REQUIREMENTS

In general, spacing between line posts shall not exceed 10'. Where breaks in a run of fencing are required, or at intersections with existing fences, appropriate adjustment in post spacing shall be made for the type of closure indicated.

When posts, braces or anchors are to be embedded in concrete, the contractor shall install temporary braces as required to hold posts in proper position until concrete has set sufficiently to hold posts. No material shall be installed on posts or strain placed on bracing set in concrete until 72 hours after concrete has been placed.

Tops of posts shall be set to required grade and alignment. Wire shall be stretched taut.

705-3.2 CONCRETE POST ANCHORAGE

Concrete shall be Class "R" in accordance with the Louisiana Standard Specifications for Roads and Bridges. Portable mixing of concrete in accordance with Engineer's specifications will be permitted for small quantities of concrete. The Contractor shall consolidate concrete by tamping or vibrating. Tops of footings shall extend slightly above ground and shall be steel troweled to a smooth finish sloped to drain away from posts. Posts, braces, and other units shall be centered in footings. Excess excavation from footings shall be disposed of satisfactorily.

705-3.3 FENCE ERECTION

Pull posts shall be placed not more than 200 feet apart in straight runs and at each vertical angle more than 20 degrees. Corner posts shall be placed at each horizontal angle more than 20 degrees. Corner and pull posts shall have a horizontal brace and tie rod on each side of posts. The horizontal brace and tie rod shall be connected to adjacent line posts.

Posts shall be permanently positioned, anchorages firmly set, and top rail or tension wire satisfactorily secured to posts before fabric is placed. Ends of fabric shall be secured by stretcher bars threaded through loops of fabric and secured to posts by clamps with bolts and nuts.

Fabric shall be placed by securing one end and applying sufficient tension to remove all slack before making attachments elsewhere. Degree of tensioning shall be commensurate with air temperatures at time of installation to prevent undue sagging or tensioning of fabric due to changing temperatures. Fabric shall be fastened to line posts at approximately equal spaces and to top rail (or top tension wire) and bottom tension wire with tie wires or bands as specified.

705-3.4 **GATE ERECTION**

Gate installation shall include gate frames, stretcher bars, filler fabric, latches, stops, locking device, padlocks, hinges, gate posts with braces, tie rods, turnbuckles, caps, and other fittings as specified or required for complete installation.

Clamps for attaching hardware shall be tightened. Bottom of gates shall clear the ground at least 3 inches at all points in its swing. The Contractor shall grade the area if necessary to meet this requirement. Stops with latches or other approved means for holding the gate open shall be provided, placed to prevent damage to gate or fence by overswing. Unless otherwise directed, stops shall be provided at the centerline of fence to arrest the swing of a closed gate.

705-3.5 **COATING REPAIR**

After completion of fence and gate installation, any damaged protective coating shall be satisfactorily repaired.

705-3.6 **GROUNDING**

Ground rods shall be installed along each segment of new or rebuilt fence, regardless of type fence post used, at maximum 500-foot intervals, or in areas where electrical lines cross the fence. Ground rods shall be copper clad 5/8"x8'. Connection to the fence shall be by means of a mechanical connection UL listed for this purpose which joins the fence post, fabric, and ground wire together. Ground wire shall be #6 copper. Top of ground rod shall be buried approximately 4".

705-3.7 **REBUILT FENCE**

When specified, the contractor shall take down, move back, and rebuild existing fence. Fence shall be rebuilt in the same manner as specified for new fence. Rebuilt ornamental fence, picket fence or other special type fence shall be equal in all respects to existing fence.

705-4 **MEASUREMENT & PAYMENT**

When listed separately in the Bid Form, items will be measured and paid as a separate unit or lump sum price. Payment for unit price items will be for the actual amount or size installed. When no separate item is listed in the Bid Form, no separate measurement shall be made. The cost of Work not listed separately in the Bid Form shall be included in another item(s) to which it most nearly relates. Contractor's prices shall include all necessary costs to complete the Work in accordance with the Plans and Specifications.

**TECHNICAL PROVISIONS
SECTION 713
TEMPORARY TRAFFIC CONTROL**

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TECHNICAL PROVISIONS
SECTION 713
TEMPORARY TRAFFIC CONTROL

713.01 DESCRIPTION

This work consists of furnishing, installing, maintaining, and removing temporary construction barricades, precast concrete barriers, lights, signals, pavement markings and signs; providing flaggers; and complying with all other requirements regarding the protection of the work, workers and safety of the public. Unless otherwise noted in the plans or special provisions this work also includes traffic control management in compliance with the contract documents and the Manual on Uniform Traffic Control Devices (MUTCD), including the installation, inspection, maintenance, and removal of all traffic control devices on the project. Signs, barricades, barriers, channelizing devices, pavement markings, etc., shall comply with plan details, the MUTCD and these specifications.

Signs, barricades, barriers, channelizing devices, pavement markings and arrangements thereof, as shown on the plans, are minimum requirements. Appropriate signs for special conditions shall be furnished and installed as directed. Requirements for proper signs, barricades, barriers, channelizing devices, or other safety precautions promulgated by the contractor's insurers are not negated by these specifications. These specifications shall not be construed to relieve the contractor of responsibilities for the safety of the public, for liability in connection therewith, or compliance with State and local laws or ordinances.

The contractor shall assign one or more authorized Traffic Control Supervisors (TCS) to provide traffic control management for the project. If more than one TCS is assigned, then a weekly schedule identifying who will be in charge of providing traffic control management on a daily basis shall be submitted to the engineer. The TCS shall have a set of all contract documents relating to traffic control or traffic staging and a current copy of the MUTCD and a current copy of Louisiana Work Zone Traffic Control Details readily available at all times.

If the contractor utilizes a subcontractor to provide traffic control management, the Subcontractor's TCS shall meet all the requirements set forth herein.

The contractor may assign one or more Traffic Control Technicians (TCT) to assist the TCS in inspection and maintenance of Traffic Control Devices.

713.02 MATERIALS

Materials for temporary signs, barricades, barriers and related devices shall comply with the following Sections and Subsections:

Portland Cement Concrete	901
Reinforcing Steel	1009
Backing Material	1015.04(b)
Reflective Sheeting	1015.05

Temporary Pavement Markings	1015.08
Raised Pavement Markers & Adhesive	1015.09
Thermoplastic Pavement Markings	1015.10
Traffic Paint	1015.12
Barricade Warning Lights	1018.12

- (a) **Temporary Pavement Markings:** Temporary pavement markings shall be a minimum of 4 inches (100 mm) wide.
- (b) **Reflective Sheeting:** Reflective sheeting requirements for temporary signs, barricades, channelizing devices, drums and cones shall comply with the following:
 - (1) **Temporary Signs and Barricades:** On the mainline of freeways and expressways, the initial advanced warning construction sign shall be fabricated using ASTM D 4956 Type X (Fluorescent Orange) reflective sheeting. Reflective sheeting for all other temporary signs and barricades shall comply with the requirements of ASTM D 4956, Type III.
 - (2) **Vertical Panels:** Reflective sheeting for vertical panels used to channelize or divide traffic shall meet the requirements of ASTM D 4956, Type III.
 - (3) **Drums:** Reflective sheeting for drums shall be a minimum of 6 inches (150 mm) wide and shall meet the requirements of ASTM D 4956, Type III, and the Supplementary Requirement S2 for Reboundable Sheeting as specified in Subsection 1015.05.
 - (4) **Cone Collars:** Reflective sheeting for traffic cone collars shall meet the requirements of ASTM D 4956, Type VI.

713.03 FABRICATION

Fabrication of temporary signs, barricades and related devices shall conform to Subsection 729.04. Fabrication of precast concrete barriers shall conform to Section 805.

713.04 TEMPORARY SIGNS AND BARRICADES

- (a) **General:** Temporary signs, barricades and related devices will be required when the contractor's work is in progress on portions of the work covered by the Notice to Proceed or when operations are suspended. During such times that temporary signs, barricades and related devices are not in place, appropriate existing regulatory signs shall be maintained by the contractor.

Construction work shall not begin until signs, barricades and other traffic control devices have been erected and approved.

When signs to be furnished and erected by the contractor are in place and approved, the contractor's Traffic Control Supervisor (TCS) shall remove or cover any standard signs that are in conflict with temporary signs.

When placing signs, the contractor shall coordinate with the engineer in removing Departmental signs, so that appropriate signs are in place at all times.

Signing shall remain in place and be maintained by the contractor, supplemented by additional signs as required, throughout the period of work. When previously used signs are to be erected on a project, the engineer will inspect and approve these signs before erection. The engineer will require any sign with reduced reflectivity or excessive color fading to be removed from the work zone. In case of a dispute over a rejected used sign, the Department at its discretion, may take such measurements or review reflectivity and color data obtained by the contractor to determine if the sign meets minimum standards for new materials. Signs that do not meet the minimum standards for new materials shall be replaced by the contractor at no direct pay.

Rejected signs will be marked "NOT FOR USE ON STATE PROJECTS" on the back of the sign.

Signs placed by the contractor shall be removed according to the Traffic Control Plan. It will be the responsibility of the Department to see that all permanent highway signs are in place upon completion and acceptance of the project.

On projects where the surface course is constructed with asphaltic concrete or portland cement concrete, permanent striping and raised pavement markers (when required) shall be completed prior to removal of barricades.

Signs, barricades and related devices furnished and placed by the contractor shall, upon removal, remain the contractor's property.

- (b) **Advance Warning Area:** When specified, advance warning arrow panels for temporary traffic control shall be provided at locations shown on the plans or as directed. Panels shall be one of the specified types complying with the Department's MUTCD. If no type is specified, Type C panels shall be furnished.
- (c) **Construction Zone:** In areas of the construction zone all traffic control devices used shall be in accordance with Temporary Traffic Control Standard Detail TC-00.

713.05 TEMPORARY PRECAST CONCRETE BARRIERS

Barrier units will be furnished by the contractor unless specified otherwise. Each barrier unit shall be 15-feet (4.6 m) in length.

When the barrier units are furnished by the Department the units will be furnished at no cost to the contractor. The contractor shall load the barrier units at the location specified, deliver the units to the construction site and place them as required.

The contractor shall relocate barrier units as required during construction.

Connecting pins and plastic reflectors shall be furnished by the contractor at no additional cost to the Department. Reflectors shall have 7.0 square inches (4,500 sq mm) minimum reflective area, and be installed a maximum of 15 feet (4.6 m) apart (each side) in

accordance with the manufacturer's recommendations. Damaged pins or reflectors shall be replaced as directed by the engineer.

After completion of the work, barrier units shall become the property of the Department and shall be removed and transported by the contractor to the location specified and unloaded as directed. All costs of loading, transporting and unloading the barrier units shall be included in the price bid on this item.

Barrier units damaged shall be satisfactorily repaired or replaced at no direct pay.

713.06 PAVEMENT MARKINGS

Color, width and type of temporary pavement markings shall be in accordance with Table 713-1 and the MUTCD. Temporary pavement markings shall be in place at the end of each day's operation.

Temporary striping tape shall be applied by approved methods to the satisfaction of the engineer. Thermoplastic Pavement Markings shall be applied in accordance with Subsection 732.03. Painted Traffic Striping shall be applied in accordance with Section 737.

Table 713-1
Temporary Pavement Markings^{1,2}

		Two-lane Highways	Undivided Multilane Highways	Divided Multilane Highways
S H O R T T E R M	ADT<1500; or ADT>1500 and time <3 days	Lane lines 4-foot (1.2 m) tape on 40-foot (12 m) centers; with “Do Not Pass” and “Pass With Care” signs as required		
	ADT>1500; Time >3 days and <2 weeks	Lane lines 4-foot (1.2 m) tape on 40-foot (12 m) centers with no passing zone markings		
	All ADT’s with time <2 weeks		Lane lines 4-foot (1.2 m) tape on 40-foot (12 m) centers; double yellow centerline	Lane lines 4-foot (1.2 m) tape on 40 foot (12 m) centers
	All ADT’s with time >2 weeks	Standard lane lines; no- passing zone markings, legends and symbols and when pavement width is 22 feet (6.7 m) or greater, edge lines	Standard Lane Lines, centerlines, edge lines, and legends and symbols	Standard lane lines, centerlines, edge lines, and legends and symbols.

¹No-passing zones shall be delineated as indicated whenever a project is open to traffic.

²On all Asphaltic Surface Treatments that are open to traffic and used as a final wearing course or as an interlayer, temporary pavement markings (tabs) on 20-foot (6 m) centers shall be used, in lieu of the 4-foot (1.2 m) tape, on 40-foot (12 m) centers.

- (a) Short-term Pavement Markings:** Short-term pavement markings will be required on any pavement surface under traffic.

Centerlines on two-lane highways and lane lines on multilane highways shall be temporary striping tape a minimum of 4 feet (1.2 m) long on a maximum of 40-foot (12 m) centers. When short-term pavement markings require no-passing zone markings or double yellow centerlines on undivided multilane highways, they shall be any of the temporary pavement markings listed in Subsection 713.02.

Removal of short-term pavement markings will only be required on the final surface.

- (b) Long-term Pavement Markings:** Long-term pavement markings will be required on any surface which is not covered by an additional surface in 2 weeks or less. Long-term pavement markings shall include, but are not limited to, standard lane and

centerline markings (i.e., 10-foot (3 m) stripes on a maximum of 40-foot (12 m) centers), edgelines, no passing zone markings on 2-lane highways, stop bars, and legend and symbol markings as shown on the permanent pavement marking details. Layout work for exact location of markings will only be required on the final surface.

These markings shall consist of any of the pavement markings listed in Subsection 713.02.

Long-term markings do not include the installation of raised pavement markings.

- (c) **Final Surface:** On the final surface (portland cement concrete pavement or asphaltic concrete pavement), temporary markings shall be placed with sufficient accuracy to avoid conflict with permanent striping where possible. Temporary pavement markings on the final surface shall be any of the pavement markings listed in Subsection 713.02.

Placing permanent markings over traffic paint will be acceptable on final surfaces provided the temporary markings have been placed in the final configuration (proper final layout) and the painted lines are not flaking or showing signs of deterioration.

The removal of temporary pavement markings, if required, shall be in accordance with the requirements for the type of permanent marking being used. There shall be no objectionable staining of pavement surface as a result of the removal procedure.

- (d) **Temporary Reflectorized Raised Pavement Markings:** When required, temporary reflectorized raised pavement markings shall be installed in accordance with Section 731.
- (e) **Pavement Markings for Asphaltic Surface Treatment:** The type of markings shall be in accordance with Table 713-1. Short-term temporary pavement markings shall be in place at the end of each day's operation. Long-term temporary pavement markings shall be in place as soon as practical after expiration of the 4 day maintenance period following the asphaltic surface treatment operation. On the final wearing course, permanent markings shall be placed two weeks following completion of the long-term temporary pavement markings.

When used on the final wearing course, painted traffic striping shall be in accordance with Section 737.

Centerlines on two-lane highways and lane lines on multilane highways shall be temporary raised markers in accordance with Subsection 1015.08(c). "No-passing zone" markings shall be any of the temporary pavement markings listed in Subsection 713.02.

The temporary raised pavement markers shall be installed in accordance with the manufacturers' recommendations or as directed by the engineer. The temporary raised markers shall be flexible reflective tabs placed at 20-foot (6 m) intervals on the centerline of the roadway. The markers shall be installed so that the reflective faces of the markers are perpendicular to a line parallel to the roadway centerline.

If directed by the engineer, the temporary raised pavement markers shall be removed after permanent striping has been accomplished. Damage to the pavement surface shall be repaired at no direct pay.

713.07 PORTABLE WORK ZONE TRAFFIC CONTROL DEVICES

All Category I, II, and III portable work zone traffic control devices, as described below, shall be crashworthy as determined by evaluations through the National Cooperative Highway Research Program (NCHRP) 350 for Test Level 3 (TL-3).

- (a) **Category I Devices:** Category I devices are low-mass, singlepiece traffic cones, tubular markers, single-piece drums and flexible delineators and are, by definition, considered crashworthy devices meeting NCHRP Report 350 TL-3 criteria. Drum and light combinations with Type A or C warning lights and fastener hardware consisting of vandal resistant 1/2 inch (13 mm) diameter cadmium plated steel bolts and nuts used with 1 1/2 inch (38 mm) diameter by 3/4 inch (19 mm) cup washers are included as Category I devices. In lieu of testing for crashworthiness, acceptance of Category I devices for compliance with NCHRP 350 will be allowed based on self-certification by the supplier. The supplier shall certify that the product is crashworthy in accordance with the evaluation criteria of NCHRP 350. This certification may be a one-page affidavit signed by the supplier, with supporting documentation kept on file to be furnished if requested.
- (b) **Category II Devices:** Category II devices include other low mass traffic control devices such as portable barricades either with or without lights and or signs, portable sign stands, portable vertical panel assemblies, and drums with lights not meeting the drum and light combination requirements for Category I. Individual crash testing is required for Category II devices. FHWA letters of approval shall serve as verification that these devices comply with the crash testing requirements of NCHRP Report 350 TL-3. The contractor shall provide the engineer a listing of all the Category II devices to be used on the project prior to installation including a reference to the FHWA Work Zone letter number for each device. The contractor shall also certify that each device has been crash tested and meets the NCHRP 350 requirements.
- (c) **Category III Devices:** Category III devices include massive devices such as concrete barriers, water filled barriers and portable attenuators. Individual crash testing is required for Category III devices. FHWA letters of approval shall serve as verification that these devices comply with the crash testing requirements of NCHRP Report 350 TL-3. The contractor shall provide the engineer a listing of all the Category III devices to be used on the project prior to installation including a reference to the FHWA Work Zone letter number for each device. The contractor shall also certify that each device has been crash tested and meets the NCHRP 350 requirements.

713.08 TRAFFIC CONTROL MANAGEMENT

- (a) **Authorization:** Prior to commencing work requiring traffic control management, the contractor shall submit to the engineer proof of the Traffic Control Supervisor's (TCS) and Traffic Control Technician's (TCT) current authorizations.

The Department will accept the TCS authorization of other approved agencies or firms only if all of the following minimum TCS requirements are met:

- (1) Successful completion of a work zone traffic control supervisor course approved by the Department.
- (2) Passing a written examination on the work zone traffic control supervisor course.
- (3) A minimum of one year full-time field experience, verified by the agency or firm, in work zone traffic control. This experience may be verified by the Department at its discretion.

The Department will accept the TCT authorization of other approved agencies or firms only if all of the following minimum requirements are met.

- (1) Successful completion of a work zone traffic control technician course approved by the Department.
- (2) Passing a written examination on the work zone traffic control technician course.

(b) **Traffic Control Supervisor (TCS) Duties:** The TCS's responsibility shall be traffic control management, and the TCS shall be available to the engineer to address traffic control management issues as needed. The following is a listing of the TCS's primary duties:

- (1) The TCS shall personally provide traffic control management and supervision services at the project site. The TCS may have other assigned duties, but shall be readily available at all times to perform TCS duties as required in the contract. A minimum of one TCT shall be required on site during working hours.
- (2) The TCS shall be responsible for observing and evaluating both the day and night time performance of all traffic control devices installed on the project, in accordance with the Traffic Control Plan (TCP), to ensure that the devices are performing effectively as planned for both safety and traffic operations. This shall be done upon the initial installation of the devices and when any modifications and/or changes are made, in addition to the inspection of traffic control required in Heading (e).
- (3) The TCS shall be responsible for revisions requested by the contractor to the traffic control plan established in the contract and shall submit the new traffic control plan in accordance with Heading (c).
- (4) The TCS shall be responsible for the training of flagging personnel. This training will ensure that all flagging done on the project is in compliance with the MUTCD Part VI and Louisiana Work Zone Traffic Control Details.
- (5) The TCS shall coordinate all traffic control operations for the duration of the contract, including those of subcontractors, utility companies, and suppliers, to

ensure that all traffic control is in place and fully operational prior to the commencement of any work. The Department recognizes that the contractor does not have direct control over the traffic control operations of the utility companies. The coordination provided by the TCS when dealing with utility companies is specifically for the purpose of coordinating concurrent utility traffic control with any other construction traffic control to avoid conflicts.

- (6) The TCS shall coordinate, in writing, all project activities with the appropriate law enforcement, fire control agencies, and other appropriate public agencies as determined at the pre-construction conference by the engineer. The TCS shall also invite the above agencies to the pre-construction conference.
 - (7) The TCS shall prepare and submit statements concerning road closures, delays, and other project activities to the news media on a weekly basis or more often as needed. News releases shall be submitted to the engineer for review and approval prior to the contractor's submittal to the news media.
 - (8) The TCS shall be responsible for notifying the engineer, or designee, immediately of all vehicular accidents and/or incidents related to the project traffic control. The time and date of notification shall be documented in the traffic control diary. The TCS shall also monitor and document queues that occur as necessary.
 - (9) The TCS assigned to the project shall attend the pre-construction conference and all project meetings.
 - (10) The TCS shall be responsible for the maintenance, cleanliness, replacement and removal of traffic control devices of the existing traffic control plan during working and non-working hours.
- (c) **Traffic Control Plan Revisions:** Requests for revision in the traffic control plan must be made in writing to the engineer a minimum of 14 calendar days in advance of the needed revision. If the requested revision falls within the scope of the existing contract drawings, the engineer may approve the revision. If the engineer determines that the requested revision is outside the scope of the contract drawings, the contractor will be required to submit a change order. The change order drawings shall conform to the following:
- (1) Letter size original contract drawings --The change order drawings shall be submitted on high quality white 8 1/2 x 11 inch letter size paper. The drawings may be hand drafted or computer drafted and arranged in landscape format on the page. The text and drawings must be legible after reproduction on standard reproduction equipment. Left, bottom and right hand margins shall be at least 1/2 inch and the top margin shall be 1 inch.
 - (2) Full size original contract drawings -- The change order drawings shall be submitted on high-quality, 4-mil, double-matte film using a plotting or reproduction process that fuses the graphics to ensure durability. Repeated handling and friction due to stacking of plans shall not smear, flake or rub off

the graphics. Improper plotter settings and plotter wear may cause inconsistent durability of the drawings. The contractor shall test samples of the submitted drawings for durability. Advance samples of matte films may be submitted for approval; however, the contract plans will be tested separately. Failures will result in rejection of the submittal. Drawing sizes shall be in accordance with Subsection 801.03(a).

Lettering on change order drawings shall be of adequate size to facilitate a 50 percent reduction of plans. Additions or changes shall be made with a permanent type of waterproof ink made for this purpose. If revised cross sections are required, the cross-sections shall be plotted on standard plate cross-section sheets. The ground line, centerline elevation, and station numbers, as a minimum, shall be drawn in ink; the remaining information may be in pencil.

Regardless of size, all change order drawings and documents required shall be identified with the DOTD project title and project number. All plans and calculations shall be signed and sealed by a professional civil engineer currently registered to practice in Louisiana.

All plans submitted by the contractor shall conform to these specifications and standards. The DOTD Chief Engineer may reject any plans not conforming to these standards.

Revisions to the TCP that are determined to be outside the scope of the original contract drawings must be approved by the DOTD District Traffic Engineering Division prior to implementation of the requested revision. In some cases on high traffic routes or high priority projects, the revisions must be approved by the HQ Traffic Operations Engineer.

- (d) **Traffic Control Diary:** The TCS shall maintain a project traffic control diary in a bound book. The contractor shall obtain a sufficient number of the diaries from the Louisiana Associated General Contractors (LAGC). The TCS shall keep the traffic control diary current on a daily basis, and shall sign each daily entry. Entries shall be made in ink in a standard format furnished by the engineer, and there shall be no erasures or white-outs. Incorrect entries shall be struck out and then replaced with the correct entry. Photographs and videotapes may be used to supplement the written text.

The traffic control diary shall be available at all times for inspection by the engineer; and the diary shall be reviewed with the engineer on a weekly basis and a copy submitted to the engineer on a monthly basis. Failure to submit the monthly copy of the diary to the engineer shall result in the withholding of the next partial payment until the past due copies of the diary are submitted. The traffic control diary shall become the property of the Department at the completion of the project.

- (e) **Inspection of Traffic Control:** The TCS shall be responsible for the inspection of all traffic control devices every calendar day that traffic control devices are in use. This inspection may be delegated to the TCT. The "Quality Guidelines for Work Zone Traffic Control Devices" standard by the American Traffic Safety Services Association (ATSSA)

shall be used to evaluate the condition of the traffic control devices to determine if acceptable for use. The TCS shall provide for the immediate repair, cleaning, or replacement of any traffic control devices not functioning as required to ensure the safety of the motorist and construction personnel and/or not meeting the ATSSA standard.

Inspection of the traffic control devices shall be conducted by the TCS at the beginning and end of each workday, and as scheduled or directed by the engineer during the workday. The traffic control devices shall be inspected by the TCS on weekends, holidays, or other non-work days at least once per day. Traffic control devices shall be inspected by the TCS at least once a week during nighttime periods and the same night after any modifications or changes have been made in the traffic control devices.

- (f) Failure to Comply:** The engineer may suspend all or part of the contractor's operation(s) for failure to comply with the approved "Traffic Control Plan" or failure to correct unsafe traffic conditions within a reasonable period of time after such notification is given to the contractor in writing.

In the event that the contractor does not take appropriate action to bring the deficient traffic control into compliance with the approved traffic control plan or to correct the unsafe traffic conditions, the Department may proceed with the corrective action using its own forces, and such costs will be deducted from payments owed to the contractor.

If the contractor's operations are suspended, the normal assessment of contract time will not cease for the period required to correct these unsafe conditions and traffic control deficiencies. The contractor shall not be relieved of the responsibility to provide traffic control safety to the traveling public when a project is under full or partial project suspension. When a project is under suspension due to the contractor's failure to comply with this section, or when the contract is under stipulated damages, the contractor shall continue to provide traffic control management and no additional measurement or payment will be made. If suspensions or partial suspensions are requested by the contractor, the additional traffic control management costs will be at the contractor's expense.

- (g) Engineer Modifications:** The provisions included in the plans and specifications for handling and controlling traffic during construction may be changed by the engineer, with the approval of the DOTD District Traffic Operations Engineer, due to actual field conditions encountered. Such changes will be made by written instruction to the contractor and shall be considered an amendment to the plans and specifications as of the date of change.

713.09 MEASUREMENT

- (a) Temporary Signs and Barricades:** When the contract does not include a pay item for "Temporary Signs and Barricades," the providing of temporary construction signs, barricades and related devices will not be measured for payment. When a pay item for "Temporary Signs and Barricades" is included in the contract, the furnishing,

erecting, maintaining and subsequent removing of temporary construction signs, barricades and related devices will be measured on a lump sum basis.

Advance warning arrow panels will not be measured for separate payment, but will be included in the contract lump sum price for Temporary Signs and Barricades.

- (b) Temporary Pavement Markings:** When the contract does not include an item for "Temporary Pavement Markings," provision of these markings will not be measured for payment.

When the contract includes an item for "Temporary Pavement Markings", these markings acceptably furnished, placed, maintained and subsequently removed will be measured by the linear foot (lin m), or by the mile (km) as specified.

When measurement is made by the linear foot (lin m) of striping, measurement will be made for the material placed. Gaps will be excluded.

When measurement is made by the mile (km) of single strip per roadway per application, no deduction will be made for the standard design gaps in broken line striping; however, deductions will be made for the length of other gaps or omitted sections.

Temporary pavement legends and symbols will be measured per each legend or symbol.

Temporary reflectorized raised pavement markers will be measured by counting the number of markers furnished, placed and accepted. Removal of raised pavement markers will not be measured for payment.

- (c) Temporary Precast Concrete Barriers:** When the contract does not include a pay item for Temporary Precast Concrete Barriers, the provision of these barriers will not be measured for payment. When the contract includes a pay item for Temporary Precast Concrete Barriers, the barriers will be measured per each unit installed, which includes construction, delivery, placement and removal from the job site one time. Further movements of barriers for subsequent construction phases will be measured per movement of each barrier.

- (d) Traffic Control Management:** Traffic control management will not be measured for payment.

713.10 PAYMENT

Payment for temporary construction signs, barricades and related devices will be at the contract lump sum price in accordance with the payment schedule of Table 713-2.

Table 713-2
Payment Schedule
Temporary Signs, Barricades and Related Devices

Percent of Total Contract Amount Earned	Allowable Percent of Lump Sum Price for Temporary Signs and Barricades
Initial Erection	40
25	60
50	80
75	95
100	100

Payment for temporary pavement markings will be made at the respective contract unit prices. Payment for temporary precast concrete barriers will be made at the contract unit price per each. The concrete in temporary precast barriers furnished by the contractor will be identified by lots and shall be subject to pay adjustments in accordance with Table 901-5 and Note 1 therein. Size, sampling, and testing of each concrete lot shall be in accordance with the Materials Sampling Manual.

Payment for movement of temporary concrete barriers will be made per movement of each barrier.

Payment will be made under:

Item No.	Pay Item	Pay Unit
713-01	Temporary Signs and Barricades	Lump Sum
713-02	Temporary Pavement Markings (inch (mm) Width)	Linear Foot (Lin m)
713-03	Temporary Pavement Markings (Broken Line)(inch (mm) Width) (foot (m) Length)	Mile (km)
713-04	Temporary Pavement Markings (Solid Line) (inch (mm) Width)	Mile (km)
713-05	Temporary Pavement Legends and Symbols (Type)	Each
713-06	Temporary Reflectorized Raised Pavement Markers	Each
713-07	Temporary Precast Concrete Barrier (Contractor Furnished)	Each
713-08	Temporary Precast Concrete Barrier (Department Furnished)	Each
713-09	Temporary Portable Barrier (Type)	Each

713-10	Temporary Precast Concrete Barrier Movement	Each

TECHNICAL PROVISIONS
SECTION 727
MOBILIZATION

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TECHNICAL PROVISIONS
SECTION 727
MOBILIZATION

727-1 DESCRIPTION

This work consists of preparatory work and operations, including those necessary for movement of personnel, equipment, supplies and incidentals to the Project Site; the establishment of offices, buildings, and other facilities necessary for work on the Project; the cost of bonds and any required insurance; and other preconstruction expenses necessary for start of the Work, excluding the cost of construction materials.

727-2 PAYMENT

- (a) When the Contract does not include a pay item for mobilization, no direct payment will be made for mobilization.
- (b) When the Contract contains a pay item for mobilization, payment will be made at the Contract lump sum price, subject to the following provisions:

Partial payments for mobilization will be made in accordance with the schedule of Table 727-1 up to a maximum of 10 percent of the original total Contract amount, including this item. Payment of any remaining amount will be made upon completion of all Work under the Contract.

Table 727-1
Mobilization Payment Schedule

Percent of Total Contract Amount Earned	Allowable Percent of the Lump Sum Price for Mobilization
1 st Partial Estimate	25
10	50
25	75
50	100

No payment adjustments will be made for this item due to changes in the Work.

Payment will be made under:

Item No.	Pay Item	Pay Unit
727-01	Mobilization	Lump Sum

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**TECHNICAL PROVISIONS
SECTION 739
TURF CONSTRUCTION**

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TECHNICAL PROVISIONS
SECTION 739
TURF CONSTRUCTION

739.1 SCOPE

This section of work consists of providing a suitable turf on all areas within the Site shown on the Drawings to be turfed and those areas where the elevation of the existing ground must be altered to attain the lines and grades shown on the Drawings by excavating or by filling, thereby leaving exposed soil or earth surfaces. Any additional areas not shown on the Drawings that are disturbed by the Contractor during performance of the work shall also be turfed, but no payment will be made for such areas. Finish grading and stockpiling of topsoil are covered in other sections of the Specifications.

739.2 TURF CONSTRUCTION

Areas described above shall be turfed by seeding or sodding as shown to control erosion and for beautification purposes.

- a. Preparing the Ground Surface:** Prior to the commencement of tilling and smooth grading, all large stones and waste materials shall be removed from the site. All heavy growths or vegetation on the site which may seriously interfere with smooth grading, tilling, or sowing or sodding operations shall be mowed, raked and burned, used for mulch if suitable, or disposed of off the site. During tilling operations, the ground surface shall be kept cleared of all materials which might hinder subsequent turfing operations.

The areas to be seeded or sodded shall be thoroughly prepared to a minimum depth of three (3) inches by disking, harrowing, cultipacking, or by other means approved by the Engineer. Tilling shall continue until the condition of the soil is acceptable to the Engineer as suitable for the type of seeding or sodding to be used.

The entire area shall be finish graded and the surfaces left at the grades shown on the Drawings in an even and properly compacted condition which will prevent the formation of low places where water will stand.

- b. Fertilizing:** Fertilizer shall be distributed uniformly over the areas to be turfed at the minimum rate of 600 pounds of 5-10-5 fertilizer per acre or the approved equivalent. Distribution shall be by hand or by a common fertilizer distributor, or other approved equipment. Use of a grain or seed drill, equipped to sow seed and distribute fertilizer at the same time will be permitted.

Fertilizer shall be incorporated to a minimum depth of three (3) inches and may be done as a part of the tilling operations, except that fertilizer shall not be applied more than 48 hours prior to sowing the seed. The incorporating may be included as part of the disking or harrowing operations, providing it is done just prior to sowing seed or placing sodding.

- c. **Seeding:** After the ground surface has been prepared and fertilized as specified above, all designated areas shall be seeded with grass seed with a minimum pure live seed content of 85%. The Contractor shall plant seed during one of two periods described below and on the following basis, the period selected being dependent on the time of the completion of grading operations unless otherwise shown on the Drawings: (1) between March 15 and June 1, 40 pounds of hulled Bermuda grass seed per acre, and (2) between October 1 and December 1, a seed mixture containing equal parts of Bermuda seed (with hulls) and Rye grass, at the rate of 40 pounds of the mixture per acre. The Contractor shall employ a method of sowing satisfactory to the Engineer, and where practical he shall make use of approved power drawn drills or seeders, or other approved equipment. The sowing shall be stopped when satisfactory results are not likely to be obtained due to excessive moisture conditions, high winds, or other unfavorable conditions. After sowing and prior to compacting, the area shall be cleared of all objects that may interfere with subsequent mowing. Immediately after sowing the entire area shall be compacted by approved rolling equipment to reduce air pockets.
- d. **Hydro-seeding:** After the ground surface has been prepared as specified above, all designated areas shall be hydro-seeded. Hydro-seeding shall consist of mixing and applying seed, commercial fertilizer, water management gel, polyacrylamide tackifier, and mycorrhizal inoculum with wood fiber and water. Seed and commercial fertilizer shall be uniformly spread over the area at the rates specified in the Seeding section above. A minimum of 535 pounds of wood fiber per acre (600 kg/ha) shall be mixed and applied with the seed. The fiber shall be in addition to straw or mulch when straw or mulch is specified. The contractor will be permitted to include fertilizer and lime in the seeding slurry for application during hydro-seeding operations.

The application rate for pellet-inoculated seed shall be determined using the seed mass exclusive of inoculant materials.

The materials and the quantities thereof to be mixed with water will be specified. The quantity of water shall be as needed for application.

Mixing of materials for application with hydro-seeding equipment shall be performed in a tank with a built-in continuous agitation system of sufficient operating capacity to produce a homogeneous mixture and a discharge system which will apply the mixture at a continuous and uniform rate. The tank shall have a minimum capacity of 962 gallons (3700 L). The engineer may authorize use of equipment of smaller capacity if it is demonstrated that the equipment is capable of performing all operations satisfactorily.

A dispersing agent may be added to the mixture provided the contractor furnishes evidence that the additive will not affect germination. Any material considered detrimental, as determined by the engineer, shall not be used.

Any mixture containing polyacrylamide tackifier shall not be applied during any rainy weather or when soil temperatures are below 41°F (5°C) or if the wind speed is above 20 miles per hour (32 km/h). Pedestrian traffic or equipment shall not be permitted to enter areas where hydro-seeding has been applied.

Prior to planting, the Engineer will approve the varieties of seed to be used.

- e. **Sodding:** The sod shall consist of live, growing grass secured from sources where the soil is fertile. Sod to be placed during the dormant stage of those grasses shall be inspected by the Engineer to verify that the grass is live and acceptable. Bermuda grass sod shall have a healthy, virile root system of dense, thickly matted roots throughout a 2 inch minimum thickness of native soil attached to the roots.

The sod shall be free from obnoxious weeds or other grasses and shall not contain any matter deleterious to its growth or which might affect its subsistence or hardness when transplanted. Sod shall be the same type grass as adjacent acceptable grass which is to remain in place.

Care shall be taken at all times to retain the native soil on the roots of the sod during the process of excavating, hauling and planting. Sod material shall be kept moist from the time it is dug until planted. When so directed by the Engineer, the sod existing at the source shall be watered to the extent required prior to excavating. Sod material shall be planted within 3 days after it is excavated.

After the designated areas have been completed to the lines, grades, and cross sections shown on the plans and as provided for in other items of the contract, sodding of the type specified shall be performed in accordance with the requirements hereinafter described. Sodding shall be either spot or block, and Bermuda grass, St. Augustine or other acceptable grass, as shown on the Drawings.

Spot Sodding: Furrows parallel to the finish contours 12 inches on centers or to the dimensions shown on the Drawings shall be opened on areas to be sodded. In all furrows, sod approximately 3 inches square shall be placed on 12 inch centers and to the proper depth so that the top of the sod shall not be more than one-half inch below finish grade. Holes of equivalent depth and spacing may be used instead of furrows. The soil shall be firmed around each block, and then the entire sodded area shall be carefully rolled with a heavy hand roller developing 15 to 25 pounds per square inch compression. Hand tamping may be required on terraces.

Block Sodding: At locations shown on the plans or where directed, sod blocks shall be carefully placed on the prepared areas. The sod shall be so placed that the entire designated area shall be covered, and any voids left in the block sodding shall be filled with additional sod and tamped. The entire sodded areas shall be rolled or tamped to form a thoroughly compact, solid mat. Surfaces of block sod, which, in the opinion of the Engineer, may slide due to the height and slope of the surface or nature of the soil, shall, upon direction of the Engineer, be pegged with wooden pegs driven through the sod blocks into firm earth, sufficiently close to hold the block sod firmly in place.

When necessary, the sodded area shall be smoothed after planting has been completed and shaped to conform to the cross section previously provided and existing at the time sodding operations were begun. Any excess dirt from the planting operations shall be spread uniformly over the adjacent areas or disposed of as directed by the Engineer so that the completed surface will present a slightly appearance.

The sodded area shall be thoroughly watered immediately after it is planted and shall be subsequently watered at such times and in a manner and quantity directed by the Engineer until completion and final acceptance of the project by the Owner.

- f. **Establishing Turf:** The Contractor shall be responsible for the proper care of seeded and sodded areas during the period when grass is becoming established. The Contractor shall protect the area against traffic or other use by placing warning signs as approved. The Contractor shall mow the entire turfed area at such times as necessary and just before the final inspection.
- g. **Repairing:** If the surface becomes gullied or otherwise damaged during the period covered by this contract, the affected areas shall be repaired to re-establish the grade, the soil and the turf as directed and as provided in this specification. Compacting of fill material shall be in accordance with applicable provisions of grading specifications. Any necessary repairing will be by the Contractor at his own expense.

739.3 EROSION CONTROL MATTING

Erosion Control Matting shall be a flexible mat of vinyl monofilaments bonded together into a three-dimensional web designed to serve as an erosion control and revegetation mat. The mat shall be engineered with the balance of web density, porosity, flexibility, and weight to provide armor cover that resists erosion while allowing a naturally vegetated ground surface to establish.

The vinyl mat shall be resistant to environmental and chemical degradation and shall have the following typical properties:

PROPERTY	TEST METHOD	VALUE
Porosity	Calculated	85-90%
Flexibility	ASTM D-1388-64 (Stiffness Test)	2000 mg-cm (Max.)
Weight	ASTM D-3776-79	24 oz/sy (Min.)
Thickness	ASTM D-1777	0.25 in.
Tensile Strength Length Direction Width Direction	ASTM D-1682-64 (2" Strip)	18 lb. 6 lb.
Elongation Length Direction Width Direction	ASTM D-1687-64 (2" Strip)	150% (Min.) 100% (Min.)

**TECHNICAL PROVISIONS
SECTION 752
VERTICAL MULTI-STAGE PUMPING EQUIPMENT**

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TECHNICAL PROVISIONS
SECTION 752
VERTICAL MULTI-STAGE PUMPING EQUIPMENT

752-1 GENERAL

752-1.1 SCOPE

Under this section of the Specifications the Contractor shall furnish and install vertical multi-stage centrifugal pumps, electric motors, and appurtenances assembled and complete as called for on the Drawings and as specified herein.

752-1.2 QUALIFICATIONS

Pumps shall be model MS as manufactured by Iconic Pump Company, or prior-approved equal. Basis of specification is MS600-40-2-1.

752-1.3 SHOP DRAWINGS

After receipt of the Notice of Award, the Contractor shall furnish the Engineer a PDF of shop drawings from the manufacturer detailing the equipment or products to be furnished including dimensional data and materials of construction. The Engineer shall promptly review this data and return to the Contractor as approved, approved as noted, or rejected. Upon receipt of accepted shop drawings, the manufacturer shall proceed with order entry of the products and/or fabrication of the equipment.

752-2 MATERIALS

752-2.1 OPERATING CONDITIONS

Pump shall be designed to pump chlorinated potable water under the following operating conditions:

• Quantity	3
• Design Point Capacity (gpm)	600
• Design Point Total Dynamic Head (ft)	160
• Minimum Efficiency at Design Point (%)	70
• Minimum Shutoff Head (ft)	200
• Minimum Flow Recommended Flow Rate (gpm)	264
• Maximum NPSHR (ft)	30
• Pump speed (rpm)	3,540
• Maximum motor size (HP)	40
• Motor voltage	460V, 3Ø, 60 Hz

752-2.2 PUMP CONSTRUCTION

Pump can shall be of seamlessly welded 304 stainless steel and shall be capable of withstanding a maximum working pressure of 360 psi. Pump motor stool and base shall be cast iron enamel coated for corrosion protection. Pump inlet/outlet port (volute) shall be cast and machined 304 stainless steel. Piping connections shall be in-line, of each size, and compatible with ANSI Type 150 raised face flanges.

Impellers shall be of enclosed design and constructed of cast 304 stainless steel. Pump shaft shall be 316 stainless steel with spline or collet locking for impellers. Pump intermediate/diffuser shall be made of drawn and machined 304 stainless steel containing a PTFE self-centering impeller wear ring. Each pump diffuser shall have guide veins welded into the unit to help maintain laminar flow inside the rotating assembly. Pump shall have tungsten carbide bearings with stainless steel spacers and guides.

Pump head/seal chamber shall be cast and machined of 304 stainless steel. Seal rotary and stationary faces shall be silicon carbide with Viton or EPR elastomers.

752-2.3 MOTORS

Pump motors shall be NEMA TC Frame motors, ODP or TEFC enclosure, NEMA Premium Efficiency and Inverter Duty electric motors. Minimum service factor will be 1.0 for Inverter Duty. Horsepower rating of motor shall not be exceeded at any point along the performance curve of the pump. The motor shall be mounted on the integral pump support stand and mated to the pump shaft. The motor shall be commercially available and of a non-proprietary design. Motors 25 HP and larger shall employ an axial thrust bearing sized to maintain downthrust load without overheating.

752-2.4 COOLING ORIFICE

To assist with keeping the mechanical seal cool, the manufacturer shall provide a cooling orifice for connection to the pump top plug. Contractor shall furnish and install stainless steel piping and valves per the manufacturer's instructions to pipe the cooling orifice discharge into the pump suction piping.

752-2.5 TESTING

Each pump shall be pressure tested at the factory for internal/external leaks and safety allowances.

752-2.6 FINISH

All non-stainless ferrous surfaces shall be prepared and coated at the factory.

752-3 INSTALLATION

752-3.1 EXAMINATION

Contractor shall off-load materials and equipment at installation site using equipment of sufficient size and design to prevent injury or damage. Material/equipment manufacturer shall provide written instruction for proper handling. Immediately after off-loading, Contractor shall inspect all components and appurtenances for shipping damage or missing parts. Any damage or discrepancy shall be noted in written claim with shipper prior to

accepting delivery. Validate all parts lists with shipping documentation. Notify the manufacturer's representative of any unacceptable conditions noted with shipper.

752-3.2 **INSTALLATION**

Install, level, and align equipment as indicated on the Drawings. Installation must be in strict accordance with written instructions supplied by the manufacturer at time of delivery. Fasteners for all connections must be tight.

Check motor and control data plates for compatibility to site voltage. Prior to applying electrical power to any motors or control equipment, check all wiring for tight connection. Verify that protective devices (fuses and circuit breakers and switches to ensure operation without binding. Open all circuit breakers and disconnects before connecting utility power. Verify line voltage, phase sequence and ground before actual start-up.

Provide lubricant for all new equipment per the manufacturer's recommendations. Fill oil chambers and grease cups of equipment with oil, grease, and preservative lubricant of the proper grade as recommended by the equipment manufacturer. Maintain lubrication during construction and until facility is accepted by the Owner.

752-3.3 **STARTUP**

The service of qualified personnel of pump supplier shall be required to supervise assembly, installation, and start-up of all pumps. Qualified personnel shall be present during the installation and start-up requirements shall include flow rate delivered with corresponding pressure developed, current draw, and vibration check. A written report verifying start-up results shall be submitted.

752-3.4 **O&M MANUALS**

The Contractor shall provide operation and maintenance manuals in PDF format containing complete information on the assembly, operation, adjustment, maintenance, and repair of the equipment, together with detailed parts lists, drawings, and photographs.

752-3.5 **MANUFACTURER'S WARRANTY**

The manufacturer shall warrant all components to be of quality construction, free of defects in material and workmanship for a minimum period of one year after the date of Substantial Completion.

752-4 **MEASUREMENT & PAYMENT**

When listed separately in the Bid Form, items will be measured and paid as a separate unit or lump sum price. Payment for unit price items will be for the actual amount or size installed. When no separate item is listed in the Bid Form, no separate measurement shall be made. The cost of Work not listed separately in the Bid Form shall be included in another item(s) to which it most nearly relates. Contractor's prices shall include all necessary costs to complete the Work in accordance with the Plans and Specifications.

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**TECHNICAL PROVISIONS
SECTION 754
PROCESS PIPING**

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TECHNICAL PROVISIONS
SECTION 754
PROCESS PIPING

754-1 GENERAL

754-1.1 SCOPE

This section governs plumbing, piping and appurtenances which convey water, sewage, compressed air, etc. and which are within or under structures, and/or connect processing or treatment units within the Project.

The Contractor shall obtain and install piping and appurtenances of various sizes, materials and joint types as shown on the Drawings. Installation methods and procedures shall conform to these specifications, pertinent ASTM, ANSI or AWWA specifications, or applicable manufacturer's installation recommendation, whichever is more restrictive. The cost included for this work shall reflect the controlling standard's requirements. All pipe, fittings, valves, and appurtenances shall be new and unused.

754-1.2 SHOP DRAWINGS

After receipt of the Notice of Award, the Contractor shall furnish the Engineer a PDF of shop drawings from the manufacturer detailing the equipment or products to be furnished including dimensional data and materials of construction. The Engineer shall promptly review this data and return to the Contractor as approved, approved as noted, or rejected. Upon receipt of accepted shop drawings, the manufacturer shall proceed with order entry of the products and/or fabrication of the equipment.

754-2 MATERIALS

754-2.1 GENERAL REQUIREMENTS

All potable water pipes, pipe related products and materials that join or seal pipes and pipe related products shall be evaluated and listed as conforming with a national consensus product (or material) standard, ASTM, AWWA, NSF/ANSI Standard 61, and/or NSF/ANSI Standard 372 and shall be labeled as such. Each length of pipe must also show the diameter and the commercial standard which is applicable to the type of pipe indicated.

Each fitting, valve, and length of pipe shall be legibly marked with the name of the manufacturer, pressure rating or class, type, service, schedule, and specification number, in conformance with the applicable Standard. Each plastic fitting and length of plastic pipe for use in potable water shall have approval by and bear the seal of the National Sanitation Foundation.

Certified tests for all pipe, fittings, couplings, restrained joints, valves, meters and linings in ferrous pipe, valves or fittings shall be made at the manufacturing plant or source to assure conformance with these specifications. The manufacturer's certificates of conformance or meter accuracy test reports shall be furnished to the Engineer by the Contractor prior to installation.

Make all tests as provided in the applicable Standard, including those which are optional or redundant, and including such tests as pipe strength, impact resistance, valve design qualification, hydrostatic pressure and leakage tests and dimensions.

754-2.2 DUCTILE IRON PIPE

Ductile iron pipe shall conform to AWWA C151. Ductile iron piping shall be pressure class 350 for pipe sizes 4" through 12", pressure class 250 for pipe sizes 14" through 20", and pressure class 200 for pipes 24" and larger. Each length of pipe shall be hydrostatically tested during manufacture at 500 psi as evidenced by manufacturer's certified test reports or UL approval label on each piece.

Pipe shall be manufactured in standard lengths of 18 or 20 feet. The pressure rating, metal thickness class, net weight of pipe without lining, length of pipe and name of manufacturer shall be clearly marked on each length of pipe. Aboveground piping shall have flanged connections, and underground piping shall have mechanical joint unless noted otherwise on the drawings.

All ductile iron pipe shall have standard thickness cement mortar lining and bituminous seal coating on the inside in accordance with ANSI/AWWA C 104. Provisions of Section 4.14 relating to characteristics of bituminous seal coat as to deleterious effect upon the quality color, taste, or odor imparted to potable water shall be strictly observed. The outside coating for underground use shall be a bituminous coating approximately 1 mil thick. Ductile iron piping for aboveground use shall be primed with Tnemec Series 20/66 Epoxy Polyamide Primer at 4.0-6.0 mils DFT, or approved equal. Intermediate and finish coats shall be field applied in accordance with Section 811 of the Technical Provisions.

The manufacturer shall furnish a sworn statement that the inspection and all specified tests have been made for fittings and joints and the results thereof comply with the requirements of AWWA/ANSI C110 and ANSI A21.11/AWWA C111.

A. PUSH-ON JOINTS & FITTINGS

Push-on joints shall be single rubber-gasket joint as described in AWWA C111/ANSI A21.11 of latest revision. Push-on fittings shall be as described in AWWA/ANSI C110 as of latest revision. Fittings shall be of ductile iron construction. Fittings shall be rated for a minimum of 150 psi working pressure.

B. MECHANICAL JOINTS & FITTINGS

Mechanical joints shall consist of the gasketed and bolted joints as detailed in AWWA C111/ANSI A21.11 of latest revision. Mechanical joint fittings shall be SSB-ductile iron compact fittings as described in ANSI/AWWA C153/A21.53 as of latest revision. Fittings shall be rated for a minimum of 250 psi working pressure. Fittings shall be of ductile iron construction. Bolting for mechanical joints shall be of stainless steel per AISI Type 416 or CA-20-F or a special corrosion resistant alloy ("Corten"). All mechanical joint fittings shall be installed with mechanical restraint or locking type glands in place of the standard glands.

C. FLANGED JOINTS & FITTINGS

Flanged joints shall be single rubber-gasket flanged and bolted joints as described in AWWA/ANSI C110 of latest revision. Flanges shall be plain (flat) faced without projection or raised face and shall be furnished with smooth or shallow serrations. Fittings shall be as described in AWWA/ANSI C110 of latest revision. Fittings shall be 125 psi flat faced flanged fittings. Fittings shall be ductile iron construction. Bolt holes for flanges shall be in conformance with AWWA/ANSI C110 of latest revision.

D. RESTRAINED JOINTS & FITTINGS

Restrained joints shall be "Lok fast" by American Cast Iron Pipe Co. or equal. Flexible joints shall be bolt on type ball and socket joints as by American Cast Iron Company, or equal.

754-2.3 PVC PIPE

PVC pipe shall be one of the following as indicated on Drawings:

- ASTM 2241. Wall thickness shall be SDR-26 unless noted otherwise. Joints shall be integral bell with gasket.
- AWWA C900. Wall thickness shall be DR-18 unless noted otherwise. Joints shall be integral bell with gasket.
- ASTM 1785. Wall thickness shall be Schedule 80 unless noted otherwise. Joints shall be socket weld.

Fittings for ASTM D2241 and AWWA C900 pipe shall be mechanical joint, ductile iron fittings. Fittings for ASTM 1785 pipe shall be molded type of machine extruded and constructed of the same material as the pipe.

No tapping or threading of plastic pipe shall be permitted on pipe with wall thickness less than Schedule 80.

754-2.4 HDPE PIPE

HDPE pipe shall be one of the following as indicated on Drawings:

- AWWA C901. Pipe and tubing shall be IPS. Wall thickness shall be SDR-11. Joints shall be fused.
- AWWA C906. Wall thickness shall be DR-11 unless noted otherwise. Pipe shall be DIPS unless noted otherwise. Joints shall be fused.

Materials used for the manufacture of polyethylene pipe and fittings shall be extra high molecular weight, high density ethylene/hexene copolymer PE 3408 or PE 4710 polyethylene resin. Pipe shall conform to ASTM D3350 and ASTM F714 and be marked with the designation AWWA C906. Pipe shall be uniform in appearance and density with no cuts, foreign inclusions, or tacky material.

HDPE fittings shall be polyethylene fusion fittings molded or fabricated. All fittings shall have the full pressure rating of the pipe to which it is attached. Field fabrication of fittings is not permitted. Material requirements for fittings are identical to those of the PE pipe.

754-2.5 POLYETHYLENE WRAP

Polyethylene wrap shall be sheets of tubular polyethylene of 6 mil thickness, having a minimum tensile strength of 1200 psi, and a moisture absorption of not more than 0.01% in 24 hours.

754-2.6 GALVANIZED PIPE

Galvanized pipe shall be standard weight steel pipe with galvanized coating, using screwed connections. Fittings shall be galvanized malleable or cast iron. Unions shall be ground joint, galvanized.

754-2.7 STAINLESS STEEL PIPE

Stainless steel pipe shall conform to ANSI/ASTM A 312, Grade TP 304, or TP 304L with dimensions conforming to ANSI B 36.19. Unless noted otherwise, pipe shall be lightweight Schedule 5 S with plan ends when used with Van-Stone flange ends, Schedule 10 S with plain ends when used for shop prefabricated welded flanged sections, and standard weight Schedule 40 S when used for threaded ends for screwed connections. All welds shall be 100% penetration fusion type. Each length of pipe shall be hydrostatically mill tested in accordance with the respective standard.

Connecting joints for sizes one-half inch (1/2") and larger shall be either Van-Stone type using angle face rings and backing flanges, welded flanges, or screwed as applicable to the pipe thickness, and unless a preference is shown on the Drawings. Flanged joints shall conform to ANSI B 16.5 for Class 150. Threaded joints shall conform to ANSI B 2.1, American National Standard for Pipe Threads. Joints sized one-eighth thru three-eighth inch (1/8"-3/8") shall be compression sleeved using rubber O-rings or equivalent seal.

Butt-welded fittings for use with austenitic stainless steel pipe shall be of the same wall thickness of the pipe and conform to ANSI/ASTM A 403, Class CR 304 or CR 304L, and forged or rolled alloy-steel pipe flanges shall conform to ANSI/ASTM A 182, Grade F 304 or F 304L.

754-2.8 COPPER/BRASS PIPE

Non-ferrous metallic pipe for exposed plant piping or interior pressure plumbing shall be either hard copper tubing, Type L, conforming to ASTM B 88, copper pipe conforming to ASTM B 42, or brass pipe conforming to ASTM B 43. Pipe for threaded connections shall be extra strength and pipe for solder connections shall be standard strength.

Furnish pipe or tubing in lengths of twelve feet (12') minimum.

Joints shall be sweat soldered in tubing and standard strength pipe. Joints in extra strength pipe may be threaded or soldered.

Fittings for solder joints in copper water tubing shall be wrought copper and bronze conforming to ANSI B 16.22. Fittings for solder to threaded joints shall be cast bronze conforming to ANSI B 16.18. Threaded fittings shall be cast bronze conforming to ANSI B 16.15.

754-2.9 COPPER TUBING

Tubing shall be Type K hard copper solder joint fittings. Make joints with 95-5 wire solder, ASTM B 32, Grade 95 TA. Do not use cored solder. Alternatively, Type K, soft temper copper

tubing, ASTM B 88, with brass compression type fittings may be used where shown on the Plans. Fittings shall be Imperial-Eastman, Parker-Hannifin, or equal.

754-2.10 GATE VALVES

For water-line service, all gate valves, size 12" and smaller, shall be resilient wedge Mueller A2360 series AWWA gate valves, East Jordan FlowMaster, or prior-approved equal. Valves installed above ground shall be flanged, N.R.S. with handwheel operators. Buried valves shall be mechanical joint, N.R.S., with square nut operator unless noted otherwise.

Gate valves shall be manufactured to the latest and best design conforming to all applicable standards of the AWWA C-509 (current), and shall also be tested and certified to ANSI/NSF 61. All valves shall be designed for 250 psi working pressure and tested at twice the rated working pressure. The valve shall have an arrow cast on the operator showing opening direction. For buried valves, the bolt that attaches the operating nut to the stem shall be recessed into the operating nut so as not to interfere with valve wrench operation. Valve boxes shall be provided for all buried valves.

The gate valve body, bonnet, stuffing box, and wedge shall be made of ASTM A-126 grey iron. Minimum wall thickness of the body and bonnet shall be per AWWA C509. The valve wedge and guide lugs shall be fully encapsulated in SBR ASTM D2000 rubber material. The peel strength shall not be less than 75 psi. Guide caps of an acetal bearing material shall be placed over the solid guide lugs to prevent abrasion and reduce the operating torque. The valve internal and external ferrous surfaces shall be coated with a fusion bonded thermosetting powder epoxy coating of 10 mils nominal thickness in accordance with AWWA C550. The valves shall have type 316 stainless steel bolts and nuts for the stuffing box.

The valve stem shall be made of manganese bronze bar stock material and shall have at least one "anti-friction" thrust washer above and below the stem collar to reduce operating torque. The design of the stem shall be such that if excessive input torque is applied, stem failure will occur above the stuffing box at such a point as to enable the operation of the valve with a pipe wrench or other readily available tool. Should stem failure occur, the stem should be removable from the valve without removing or disassembling the valve body and bonnet. The stem material shall provide a minimum 70 ksi tensile strength with 15% elongation and a 40 ksi yield strength.

The NRS valves shall have a stuffing box that is O-Ring sealed. Two O-Rings shall be placed above and one O-Ring below the stem thrust collar. The thrust collar shall be factory lubricated. The thrust collar and its lubrication shall be isolated by the O-Rings from the waterway and from outside contamination providing permanent lubrication for long term ease of operation.

The Contractor must present a certificate to verify that valves have been subjected to pressure testing as specified in AWWA C-509.

754-2.11 PLUG VALVES

Plug valves shall be round 100% port eccentric plug valves as manufactured by Golden Anderson, Crispin, or approved equal. Valves shall be quarter turn with encapsulated plug for wastewater service up to 175 psi. Valves shall be designed, manufactured, and tested in accordance with ANSI/AWWA C517. Valves shall have flanges with drilling to ANSI B16.1, Class 125.

Valves shall have port areas of not less than 100% of the pipe area. Valves shall have a seat that is a welded overlay of 95% pure nickel applied directly to the body on a pre-machined, cast seating surface and machined to a smooth finish. Shaft seals shall consist of a V-type packing in a fixed gland with an adjustable follower and removable shims under the follower flange to provide for adjustment and prevent over-compression. Permanently lubricated, radial shaft bearings shall be supplied in the upper and lower bearing journals to eliminate the need for grease fittings. Thrust bearings shall be provided in the upper and lower journal areas, except for threaded type which only have upper thrust bearings. Both the packing and bearings in the upper and lower journals shall be protected by Buna-N shaft seals located on the valve shaft to minimize the entrance of grit into the bearing journal and shaft seal areas.

Valve bodies and covers shall be constructed of ASTM A126 Class B gray iron. Plugs shall be of one-piece construction and made of ASTM A536 Grade 65-45-12 ductile iron fully encapsulated with resilient facing per ASTM D2000-BG and ANSI/AWWA C517 requirements. Radial shaft bearings shall be constructed of self-lubricating Type 316 stainless steel. Thrust bearings shall be PTFE. Cover bolts shall be corrosion resistant with zinc plating. The interior and exterior of the valve shall be coated with a fusion bonded epoxy.

Valves shall be provided with totally enclosed and sealed worm gear actuators with position indicator, handwheel, and externally adjustable open and closed stops. The worm segment gear shall be ASTM A536 Grade 65-45-12 ductile iron with a precision bore and keyway for connection to the valve shaft. Bronze radial bearings shall be provided for the segment gear and worm shaft. Alloy steel roller thrust bearings shall be provided for the hardened worm.

754-2.12 BUTTERFLY VALVES

Manually operated butterfly valves shall be Class 150B, flanged short body design unless otherwise indicated on the Drawings. Butterfly valves shall be of the tight closing, rubber seat type conforming to the design standards of ANSI/AWWA C504, latest revision except as modified or supplemented herein. Valves shall be bubble tight at the rated pressure and shall be suitable for throttling service and/or operation after long periods of inactivity. Maximum operating non-shock shut-off pressure and maximum operating non-shock line pressure is 150 psi. Each valve shall be performance and leak tested as specified in AWWA C504.

Valves shall have cast iron ASTM A-126, class B or ductile iron ASTM A-536 bodies with ANSI B16.1 flange drilling. Disc shall be constructed of 316 stainless steel or epoxy coated ductile iron ASTM A-536. Epoxy coating shall conform to AWWA NSF 61. Valves shall have a one-piece through shaft constructed of ASTM A-276, grade 304 stainless steel. Bearings shall be self-lubricated, corrosion resistant sleeve type, suitable for horizontal and/or vertical shaft loading.

The resilient seat shall be Buna-N or EPDM rubber and shall be simultaneously bonded and vulcanized to the body of the valve or the disc providing a 360° continuous seating surface. Resilient seat mating surface shall be 316 stainless steel. All interior surfaces in contact with water, excluding stainless steel, shall be completely rubber lined or coated with NSF 61 epoxy. Valve exterior shall be factory primed per Section 811 of the Specifications. Valves shall be provided with gear actuators and hand wheel type operators unless shown otherwise on the drawings. Butterfly valves shall be Crispin K-FLO, Valmatic, or approved equal.

754-2.13 PUMP DISCHARGE CHECK VALVES

Check valves shall be stainless steel globe style silent check valves, as shown on the Drawings, suitable for pressures up to 500 psig water service. The check valve shall be silent operating type that begins to close as the forward flow diminishes and fully closes at zero velocity preventing flow reversal and resultant water hammer.

Check valves shall be Factory Mutual approved and shall meet the requirements of ASME B16.34 and MSS SP-126. The valves shall be certified to NSF/ANSI 61 and shall be certified to be lead-free in accordance with NSF/ANSI 372. Globe style valves shall have flat faced flanges in accordance with ASME B16.1 for Class 125 or class 250 iron flanges.

The valve design shall incorporate a center guided, spring loaded disc having a short linear stroke that generates a flow area equal to the nominal valve size. All component parts shall be field replaceable without the need of special tools. Valves shall be provided with a replaceable guide bushing held in position by the spring. The spring shall be designed to withstand 100,000 cycles without failure and provide a cracking pressure of 0.5 psi. The disc shall be concave to the flow direction providing for disc stabilization, maximum strength, and a minimum flow velocity to open the valve. The valve disc and seat shall have a seating surface finish of 16 micro-inch or better to ensure positive sealing at all pressures. The leakage rate shall not exceed the allowable rate for metal seated valves allowed by AWWA C508. Wafer style valve seats shall be fully retained with full size threads and sealed with an O-ring. Globe style valve seats shall be contained with a machined counterbore and restrained by the mating flange and gasket.

The valve body, seat, and disc shall be constructed of ASTM A351 Grade CF8M stainless steel. Compression spring shall be ASTM A313 Type 316 stainless steel with grout ends.

A resilient seal shall be provided on the seat to provide zero leakage at both high and low pressures without overloading or damaging the seal. The seal design shall provide both a metal-to-metal and metal-to-resilient seal.

The valve shall be hydrostatically tested at 1.5 times the rated cold working pressure. Silent check valves shall be Val-Matic Series 1800A, or approved equal.

754-2.14 MECHANICAL JOINT CHECK VALVES

Mechanical joint check valves shall have integral mechanical joint ends. Body shall be constructed of ASTM A-536 Grade 65-45-12 ductile iron. Valve opening shall provide full pipe flow area. Bonnet shall be ductile iron domed access for easy removal and inspection of the flexible disc assembly. Disc shall be the only moving part. Disc shall be fully EPDM encapsulated steel with nylon reinforcement in the flex area. Body seat shall be 45° to reduce the travel of the disc to the full open position. The valve interior shall be fully coated with liquid thermosetting epoxy suitable for use in potable water service. The exterior shall be coating with a universal primer enamel. Valve shall have a 250 psi rating and shall conform to AWWA C508. Mechanical joint check valves shall be Milliken SA-Series or approved equal.

754-2.15 VALVE BOXES

All valves outside of structures in underground installations shall have valve boxes which shall be of cast iron, two-piece, screw type, heavy roadway type, with inside diameter of barrel not

less than 5 inches. The word "Valve" shall be plainly cast on the cover. Sliding top section shall be equipped with a horizontal flange at the bottom.

754-2.16 AIR RELEASE VALVES

Air release valves shall be one of the following based on the valves placement of service:

A. SEWAGE:

An air release valve, complete with concrete box and cast iron frame and cover shall be installed at each location noted. The valves shall be the No. 400 APCO Sewage Valve, as manufactured by Valve and Primer Corporation, Schaumburg, Illinois, or the Crispin Sewer Valve, as manufactured by Multiplex Manufacturing Company, Berwick, PA., or equal, complete with rubber hose and quick disconnect couplings for back flushing with water, or where water is not available, provision shall be made for flushing with pumped sewage from the main. Venting orifice shall be 1/4".

B. POTABLE WATER:

Pressure air release valves shall be installed at high points as shown on the Drawings to vent the accumulation of air within the line while under pressure. The valve shall operate through a compound lever system and shall have a 1/4" orifice with valve sealing faces of an adjustable Buna-N rubber valve and stainless steel. The valve shall have a 1" NTP screwed inlet connection unless noted otherwise. Valve shall have a cast iron body and top. Float and trim shall be stainless steel. Valves which use a needle to seal the orifice shall not be acceptable. The valves shall be Crispin Pressure Air Valves, or approved equal.

C. DEEP WELL:

All water wells shall have combination air and vacuum valves where indicated on the plans. Combination air valves shall be float operated valves designed to release accumulated air or gas from a piping system while the system is in operation and under pressure. In addition, the valves shall discharge large quantities of air during pipe filling operations and intake large quantities of air during pipe draining and water column separation conditions. Air valves shall have fiberglass reinforced nylon or stainless-steel bodies. Valves shall have rolling seal mechanism to allow full or partial opening and sealing of orifice and floats shall be made of foamed polypropylene. Valves shall have a working pressure of 3-250 PSI and test pressure of 360 psi. Valves shall have a written 5-year warranty on all parts except the float. Valve float shall have a lifetime warranty. Valves shall be a 2" ARI D-46 or approved equal.

754-2.17 CONTROL VALVES

Control valves shall be single-seated, line pressure operated, diaphragm actuated, pilot controlled globe valves. The valves shall seal by means of a corrosion-resistant seat and a resilient seat disc. These, and other parts, shall be replaceable without removing the valve from the line. The stem of the main valve shall be guided top and bottom by integral bushings. Alignment of the body, bonnet, and diaphragm assembly shall be by precision dowel pins. The diaphragm shall not be used as a seating surface, nor shall the pistons be used as an operating means. The pilot system shall be furnished complete and installed on the main valve. The pilot system shall include opening/closing speed control, Y-strainer, and isolation ball valves.

The main valve body and bonnet shall be ductile iron per ASTM A536, Grade 65-45-12 with 150# flanged connections. All ferrous surfaces shall be coated with 4 mils of epoxy. The main valve seat ring and control pilots shall be no-lead bronze. Elastomers shall be EPDM. The speed control and isolation ball valves shall be brass, and control line tubing shall be HDPE. Valves shall be certified to NSF/ANSI 372 and NSF/ANSI 61-G. Valves shall be as manufactured by OCV Control Valves, or approved equal.

The pilot system shall open the main valve when power is supplied to the pilot solenoid valve. Valve shall also provide pressure sustaining function. Pilot system shall be such that the main valve fails in the closed position. Solenoid valve shall be 120VAC with weatherproof enclosure.

754-2.18 CONTROL VALVE ENCLOSURES

The Contractor shall provide insulated enclosures to protect the control valves from freezing. Enclosures shall be sized to accommodate the control valve piping as shown on the Drawings.

Control valve enclosures shall be constructed of 18 gauge minimum 5052-H32 marine grade aluminum per ASTM B209. Walls shall be insulated with 1.5" thick R-9 insulation. Roof shall be insulated with 3" thick R-18 insulation. Aluminum and insulation shall be securely bonded to form a composite panel. The exterior of the panels shall have a protecting PVC masking to protect the finish.

Access panels shall be provided on each of the long sides. Access panels shall have factory installed locks. Drain relief panel shall be constructed of the same materials as the wall panels and shall be located in one of the access panels. The drain relief panel shall have a stainless steel hinge and stainless steel spring as a positive means of closure.

If called for on the Drawings, enclosure shall be provided with heating equipment. Heater shall be 120VAC and shall be ETL, UL, or CSA certified.

Enclosure shall be installed on a concrete slab as shown on the Drawings and per the size recommended by the enclosure manufacturer. Enclosure shall be secured to the slab using stainless steel concrete wedge anchors provided by the manufacturer.

Enclosures shall be AquaShield Protective Enclosures, or approved equal.

754-2.19 BLADDER TANKS

Bladder tank shall be 792 gallon pre-charged steel hydro-pneumatic tank with replaceable heavy duty butyl bladder. The tank shall have NPT epoxy lined system connections and a standard tire valve charging connection to allow for on-site charging. Contractor shall charge the tank onsite to 65 psig. The tank shall be constructed of carbon steel with epoxy liner. All components and linings in contact with water shall be NSF certified. Maximum design pressure shall be at least 125 psi. Tank must be constructed in accordance with the most recent addendum of Section VII Division 1 of the ASME Boiler and Pressure Vessel Code. Bladder tank shall be FXA-3000S by AAtanks, or approved equal. Tank shall be coated in accordance with Section 811 of the Specifications.

754-2.20 FIRE HYDRANTS

Fire hydrants shall meet or exceed ANSI/AWSA C502, latest revision. Rated working pressure shall be 250 psig, test pressure shall be 500 psig and hydrants shall include the following specific design criteria:

The main valve closure shall be of the compression type. Traffic feature to be designed for easy 360° rotation of nozzle section during field installation.

The main valve opening shall not be less than 5-1/4 in. and be designed so that removal of all working parts can be accomplished without excavating. The hydrant valve shall be constructed of EPDM rubber and have a vertical taper of 20° or less. The bronze seat shall be threaded into a bronzed drain ring. The draining system of the hydrant shall be bronze and positively activate by the main operating rod. Hydrant drains shall close completely after no more than three turns of the operating nut. There shall be a minimum of two internal ports and four outlets to the exterior of the hydrant. Drain shutoff to be by direct compression closure. Sliding drains are not permitted.

Hydrant upper barrel shall be factory coated with Electrodeposition (E-coat) epoxy primer and catalyzed two-part polyurethane top coating. Base shall be coated with fusion-bonded epoxy. All bolting below grade shall be 304 stainless steel.

Shoe shall have a 6" mechanical joint connection. Hydrant shall be installed with a 6" retainer gland on the shoe unless the hydrant is connected using a swivel adapter.

All 6" fire hydrants shall be three-way hydrants with two 2-1/2" hose nozzles and one 4-1/2" pumper nozzle. Hydrants shall open by turning to left. Hydrants shall have 5-1/4" main valve openings. Fire hydrants shall be Mueller Super Centurion 250, East Jordan Water Master, or prior-approved equal.

754-2.21 FLUSH HYDRANTS

Flush hydrants shall be post flushing hydrants with a non-turning operating rod, and shall open to the left. All of the working parts shall be of bronze to bronze design and shall be serviceable from above ground with no digging. The hydrant barrel segment shall be 100% hollow and shall have a traffic breakable union. When open, the valve shall be 100% unobstructed resulting in maximum cleansing velocity in the main. Hydrants with weep holes are not allowed. Hydrants shall be Lead Free and shall be certified to NSF/ANSI 372.

2" flush hydrants shall have a 2.5" brass NSFT discharge with cap and chain and a 2" FIP inlet. Unit shall be Kupferle Foundry Company model Mainguard No. 77 with no drain, or approved equal.

Connect flush hydrant to main via a 2" water service assembly without meter or check valve.

754-2.22 TAPPING SLEEVES & VALVES

Tapping sleeves shall be stainless steel with a flanged outlet for connection to the tapping valve. Tapping sleeves are bolted around the main, and the bolts tightened. The valve is bolted to the flanged outlet of the sleeve and with the valve open, the tapping machine is bolted on and the tap made. The cutter is then withdrawn, the valve closed, and the machine removed. Tapping is accomplished with no interruption of service.

The tapping sleeve shell, flange, bolts, and nuts shall be constructed of type 304 stainless steel. Tapping sleeves shall include a 3/4" NPT stainless steel test port and plug for pressure testing before tapping the pipe. Tapping sleeves shall be Romac Industries model SST, or approved equal.

All mechanical joint tapping valves shall be mechanical joint x flanged end resilient wedge gates valves as described in the gate valve section of this specification.

754-2.23 PROPELLER METERS

Propeller meters shall be magnetic drive, sealed housing, flanged tube meters for 150 psi working pressure. Meters shall comply with the applicable provisions of AWWA. The meter shall have an indicator hand and six-digit sealed totalizer. Totalizer shall have units of gallons and shall be accurate within 2% of true flow. The flow indicator shall be a 4" diameter, 250° sweep dial with a sweep test hand. Indicator dial shall be furnished in units of GPM. The indicator/totalizer shall be encased in an O-ring sealed bonnet made from injection molded 20% glass filled engineered grade of thermoplastic. The bonnet shall be attached to the meter head by screws with seal wire holes and a hinged lid with padlock hasp.

The meter tube shall be fabricated of steel pipe with 150 lb. AWWA class "D" flat face steel flanges. The inside and outside of the tube shall be blasted to near white metal and coated with 12 mils minimum of NSF approved, fusion epoxy coating. Meter tubes shall have a constant nominal inside diameter to offer minimum obstruction to the flow and shall be furnished with four straightening vanes.

The meter head shall be connected to the tube by means of a flanged, O-ring sealed connection with stainless steel bolts. The meter head shall be designed for easy removal of water wetted parts from the tube for inspection or repair without having to remove the complete tube. Water wetted meter components that are permanently attached to the meter tube will not be accepted.

The gear box shall be bronze, sealed and filled with a high-grade lubricant. The drive mechanism shall be magnetically driven from the propeller, through a magnetic coupling and shall be isolated from the water flow by means of an O-ring sealed housing. A rigid stainless steel vertical shaft is required from the miter gear frame to the totalizer drive magnet.

The propeller shall use a water lubricated ceramic sleeve and spindle bearing system. The stainless steel/ceramic spindle on which the propeller is mounted shall be parallel to the direction of flow. The propeller shall be conical shaped with three blades of injection molded plastic material resistant to normal water corrosion and deformity due to high velocity.

Propeller meters shall be Water Specialties Model ML04, or approved equal. Meters shall be installed as shown on the Drawings.

754-2.24 COATED DETECTOR WIRE

Coated detector wire shall be #12 AWG copper clad steel, high strength with a minimum 450lb. break load, with minimum 30 mil HDPE insulation thickness. For installation by HDD, tracer wire strength shall be 1,150 lb. break load. Connectors shall specifically designed for buried service. Connectors shall include 3-way lockable connectors filled with dielectric silicon to seal out moisture and corrosion. Grounding of the detector wire shall be achieved

by use of a drive-in magnesium anode (min. 0.5 lb.) specifically manufactured for this purpose. Detector wire and accessories shall be Copperhead, or approved equal.

754-2.25 RESTRAINING GLANDS FOR MJ FITTINGS

Mechanical joint retainer glands for PVC pipe shall be cast from 60-45-12 ductile iron and shall have bolt circles, bolt holes, and "M" and "N" dimensions which will permit the glands to be used with standard mechanical joint bells and standard length bolts, as per specification ANSI A21.11-latest and AWWA C 11-latest. These glands shall have serrations on the ID sufficient to hold working and testing pressures as stated by manufacturer and shall be used in lieu of the standard. gland. Retainer glands shall be as manufactured by EBAA Iron, Inc., Eastland, Texas or approved equal. Retainer glands are required for all mechanical joint fittings and shall be installed per manufacturer's installation instructions.

754-2.26 JOINT RESTRAINTS FOR GASKET JOINT PIPE

Joint restrainers shall be designed to provide total joint restraint for PVC pipe without thrust blocking, tie rodding or harnessing. Clamp rings shall be installed on both sides of the joint and connected with ductile iron threaded rods. Restraining devices and T-bolts shall be manufactured from high strength, quality ductile iron, ASTM A536 Grade 65-45-12. Clamping bolts and nuts shall be manufactured from COR-TEN Steel. Joint restrainers shall be Series 1350 or 1390 as manufactured by Uni-flange Corporation or approved equal. Restrainers shall be installed as per manufacturer's installation instructions.

754-2.27 SLEEVE-TYPE COUPLINGS

Sleeve-type steel couplings shall be of the wide range type to fit steel, cast iron, ductile iron, PVC, and AC and rated for 150 psi working pressure. Sleeve and flanges shall be of ductile iron construction per ASTM A536. Gaskets shall be styrene-butadiene rubber. Bolts and nuts shall be corrosion resistant, high strength alloy oval neck track head bolts per ASTM A242, ANSI/AWWA C111/A21.11 (ASTM A193 B5, B7) and heavy hex nuts per A563. Couplings shall be certified to ANSI/NSF Standard 61, Annex G and ANSI/AWWA Standard 372. Couplings shall meet or exceed ANSI/AWWA C219 Standard as applicable. Couplings shall be JCM Industries Series 200, or approved equal.

754-2.28 EXPANSION JOINTS

The Contractor shall furnish and install expansion joints as shown on the Drawings. Expansion joints shall be Proco Style 231 Spool Type Rubber Joints, or approved equal. Expansion joints shall have a single arch unless noted otherwise on the Drawings. Cover and tube elastomer shall be chlorobutyl.

754-2.29 DISMANTLING JOINTS

The Contractor shall furnish and install dismantling joints as shown on the Drawings. Dismantling joint shall be Romac DJ405, or approved equal. Body, spool, gland, and lugs shall be coated with a fusion bonded epoxy. Dismantling joint shall accommodate up to 4.5" in total length and up to 3° of deflection.

754-2.30 WATER SERVICE ASSEMBLIES

3/4" thru 2" service assemblies shall consist of a brass service saddle, corporation stop, curb stop, and meter box, and any necessary couplings, fittings, and adapters as shown in the standard details. The Contractor may choose to use a tapping collar in lieu of service clamps on asbestos-cement pipe. The costs of these items will be included in the price bid for service assembly. Service assemblies shall also include a gate valve with plastic box on the customer side of the meter if shown on the drawings.

Service assemblies larger than 2" shall consist of a tapping sleeve or saddle, AWWA gate valve, AWWA gate valve, meter and meter box, check valve, and any necessary couplings, fittings, and adapters.

A. CORPORATION STOPS:

3/4" and 1" corporation stops shall be Ford F1000 corporation stop, or approved equal. Corporation stop shall have AWWA taper thread inlet and pack joint outlet connection for CTS O.D. HDPE tubing. 1-1/4" - 2" corporation stops shall be Ford FB1000 ball corporation stop, or approved equal. Corporation stop shall have AWWA taper thread inlet and pack joint outlet connection for CTS O.D. HDPE tubing. Service assemblies larger than 2" shall have AWWA gate valves in lieu of corporation stop.

B. CURB STOPS:

Curbs stops/meter valves for 3/4" and 1" services shall be included with the meter boxes as described above. Curb stops for 1-1/2" and 2" services shall be Ford BF43 Ball Meter Valves or approved equal. Valves shall have pack joint inlet connections for CTS HDPE tubing and meter flange outlets. All curb stops shall be provided with a padlock wing. AWWA gate valves shall be provided in lieu of curb stops for all services larger than 2".

C. CHECK VALVES:

When called for on the drawings, 3/4" and 1" service assemblies shall include Ford, or approved equal, brass straight cartridge style dual check valves. Inlet connections shall be meter swivel nut, and outlet shall be female iron pipe. When called for on the drawings, 1-1/2" and 2" service assemblies shall include Ford HFS31 or approved equal, inline accessible straight dual check valve. Valves shall have meter flange inlet connections and FIP outlets. All check valves shall be ASSE approved.

D. SERVICE PIPING:

3/4" through 2" plastic service piping shall be Iron Pips Size (IPS) - OD ASTM D2737 - SDR 11 PE 3408 polyethylene tubing with working pressure of 200 psi at 74°F. All service piping shall be installed with approved tracer wire.

754-2.31 GAUGE ASSEMBLIES

Gauge assemblies shall consist of threaded brass pipe taps, fittings, an isolation valve or gauge cock, the pressure or vacuum gauge, and a gauge diaphragm where indicated.

Pressure or vacuum gauges shall be bronze or stainless steel Bourdon tube, stainless steel rack and pinion movement, mounted on socket independent of case, steel or aluminum alloy or phenol cased, black numerals on white background and long life plastic dial face, heavy glass or unbreakable plastic window, 4-1/2 in. dial size, accuracy $\pm 1/2$ percent, 1/4" NPT

connection. Gauges shall be equal to Hellicoid by American Chain and Cable Co., Bridgeport, Ct; Ashcroft by Dresser Industries, Stratford, CT; or U.S. Gauge by Ametek, Sellersville, PA.

Discharge gauges shall be selected at the nearest standard range which provides an upper limit above the pump shut-off head or the pump or blower relief valve setting. Suction gauges shall have compound dials with range from 34 ft. water vacuum to 140 ft. head, unless designated otherwise. Suction and discharge gauges for clear water service shall be glycerin filled.

Unless otherwise noted, discharge gauges for sewage, sludge or chemical service shall be combination dials with a range of 0 to 60 psig and 140 feet of water. Sewage, sludge, or chemical gauges shall employ a Teflon or other appropriate diaphragm seal coating and housing lining. The bottom housing shall be removable for cleaning without removing the diaphragm and shall be tapped for 1" NPT and valved. In lieu of the gauge diaphragm with 1" tap, it will be acceptable for appropriate service, such as sludge, to furnish a flanged isolating pressure sensor with 1/4 in. tap and full pipe diameter elastomer sensing element as manufactured by Red Valve Co., Inc., Carnegie, PA; Robbins Myers (Moyno RKL), Lumberton, NJ; Dover Corporation (Ronningen-Petter), Portage, MI; or acceptable equivalent. The pressure gauge and diaphragm portion shall be pre-filled with ethylene glycol or silicone oil.

Flanged isolating pressure sensors with full pipe diameter sensing elements shall be furnished and installed where shown and scheduled on the Drawing.

754-2.32 SAMPLING STATIONS

Stations shall be furnished and installed in the quantity indicated. Sample taps shall have a smooth nozzle which faces downward. Tap shall be 12 to 18 inches above grade and enclosed. Bury shall be compatible with specified pipe bury.

Unit shall be enclosed in a lockable aluminum housing. All wet components and all working parts shall be brass. Unit shall be Lead Free and shall be certified to NSF/ANSI 372. Station shall have a 3/4" FIP inlet. Provide a Lead Free brass 3/4" MIP x pack joint coupling to connect unit to HDPE service tubing. Provide a copper vent tube to allow the station to be pumped free of standing water to prevent freezing.

Unit shall be Kupferle Eclipse #88, or approved equal.

754-2.33 PIPE SUPPORTS

Pipe supports shall be provided where indicated on the plans and where necessary to properly support piping. In no case shall pump suction and discharge piping be left unsupported. Pipe supports shall be hot dipped galvanized adjustable pipe supports with support saddle sized for the size and type of pipe being supported. Supports shall be bolted to the concrete using hot dipped galvanized bolts and adhesive or mechanical anchors. Pipe supports shall have a minimum 25,000 lb. static load capacity. Pipe supports shall be Pipeline Products, or approved equal.

754-2.34 HOSE BIBS

Interior hose bibs shall be brass, chrome plated, with 1/2-inch male inlet threads, hexagon shoulder and 3/4" hose connection. Faucet shall be with 4-arm or lever handle and shall have a vacuum breaker. The hose bibbs exposed piping and fittings shall be insulated for freeze protection using 3/4" insulation.

754-2.35 ESCUTCHEONS

Escutcheons shall be furnished and installed for all exposed lines passing through floors, walls, and ceilings. They shall be of chrome plated steel material and shall be of such flange size as to cover necessary penetration openings.

754-2.36 LEAD FREE PIPING, SOLDER, & FLUX

All installations of, or repairs to, public water systems or residential and non-residential plumbing facilities that provide drinking water and which are connected to a public water supply shall be made using lead free piping, solder, and flux. Lead free shall refer to not containing more than a weighted average of 0.25% lead when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures. When used with respect to solder and flux, "lead free" refers to solder and flux containing not more than 0.2% lead.

754-2.37 EMBEDMENT CLASSES

Where embedment material is specified by a Class, the following table defines material requirements:

SOIL CLASS	SOIL TYPE	DESCRIPTION OF MATERIAL CLASSIFICATION
Class I Soils	—	Manufactured angular, granular material 1/4 to 1-1/2 inches (6 to 40 mm) size, including materials having regional significance such as crushed stone or rock, broken coral, crushed slag, cinders, or crushed shells.
Class II Soils	GW	Well-graded gravels and gravel-sand mixtures, little or no fines. 50% or more retained on no. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
	GP	Poorly graded gravels and gravel-sand mixtures, little or no fines. 50% or more retained on No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
	SW	Well-graded sands and gravelly sands, little or no fines. More than 50% passes No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
	SP	Poorly graded sands and gravelly sands, little or no fines. More than 50% passes No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
Class III Soils	GM	Silty gravels, gravel-sand-silt mixtures. 50% or more retained on no. 4 sieve. More than 50% retained on no. 200 sieve.
	GC	Clayey gravels, gravel-sand-clay mixtures. 50% or more retained on No. 4 sieve. More than 50% retained on No. 200 sieve.
	SM	Silty sands, sand-silt mixtures. More than 50% passes No. 4 sieve. More than 50% retained on No. 200 sieve.
	SC	Clayey sands, sand-clay mixtures. More than 50% passes No. 4 sieve. More than 50% retained on No. 200 sieve.
Class IV Soils	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands. Liquid limit 50% or less. 50% or more passes No. 200 sieve.
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.

SOIL CLASS	SOIL TYPE	DESCRIPTION OF MATERIAL CLASSIFICATION
	CH	Inorganic clays of high plasticity, fat clays. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
Class V Soils	OL	Organic silts and organic silty clays of low plasticity. Liquid limit 50% or less. 50% or more passes No. 200 sieve.
	OH	Organic clays of medium to high plasticity. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
	PT	Peat, muck, and other highly organic soils.

754-2.38 WATER TREATMENT CHEMICALS

Any chemicals supplied under this contract applied to treat potable drinking water shall meet the requirements of NSF/ANSI Standard 60 as certified by an ANSI-accredited testing agency.

754-3 INSTALLATION

754-3.1 GENERAL

All piping, fittings, services, valves, and accessories shall be stored, handled, laid, and placed in accordance with the manufacturer's recommendations, except in case of conflict with this Specification in which case this Specification shall govern.

All pipe and materials shall be carefully handled by hand or with cushioned slings or supports. Dropping from trucks or into the trench shall not be permitted. Store and string materials for potable water piping in locations and for durations that will maximize cleanliness to facilitate disinfection. Keep piping free from scale and dirt. Protect open pipe ends whenever work is suspended during construction. To prevent foreign bodies from entering and lodging there, install temporary plugs or use other approved method.

Installation methods and procedures shall conform to these specifications, the state of Louisiana Sanitary Code, pertinent ASTM, ANSI, AWWA, or DOT specifications, or applicable manufacturer's installation recommendation, whichever is more restrictive. Installation shall specifically conform to AWWA C600 and AWWA C605.

Arrange and install piping approximately as indicated, straight, plumb, and as directed as possible; form right angles or parallel lines with building walls, paying particular attention to exposed piping. The best practicable appearance of piping runs will be required. Keep pipes close to walls, partitions, ceilings and offset only where necessary to follow walls as directed.

Locate groups of pipes parallel to each other. Space them at distances to permit applying full insulation and to permit access for servicing valves, etc.

Install horizontal gravity piping at a normal, uniform slope of 1/4" per foot unless otherwise noted. Where this is impossible, set slope as directed, but in no case less than 1/8" per foot. Soil lines 3" and smaller must slope at not less than 1/4" per foot.

Grade other piping as specified for the type of service specified, or as directed.

All buried piping shall have a minimum cover of 30" over the pipe. Continuous and uniform bedding shall be provided in the trench. Backfill material shall be tamped in layers around

the pipe and to a sufficient height above the pipe to adequately support and protect the pipe. Stones found in the trench shall be removed for a depth of at least 6" below the bottom of the pipe.

All tees, bends, plugs, hydrants, etc. shall be provided with thrust blocking in addition to the locking glands and/or tie rods specified elsewhere. Thrust blocks shall be poured to the dimensions shown on the Drawings and shall bear against firm, undisturbed soil. All fittings, valves, or hydrants shall be wrapped with PE sheeting, as described in the Ductile Iron Pipe section of this specification, prior to pouring thrust blocks.

Where changes in pipe sizes occur, do not "bush down" but use reducing fittings only. Where drainage piping changes in direction, use long-sweep bends where possible; otherwise use short-sweep 1/4 bends or combination Y's and bends.

Provide unions, screwed, or flanged, where indicated and in the following locations even if not indicated:

- In by-passes around equipment.
- In connections to hot water generators, water tanks, pumps or other equipment requiring disconnection for repairs or replacement. Install between shut-off and equipment.
- In drainage piping, only on inlet side of fixture traps. Do not conceal unions in walls, partitions, ceilings. Use right-and-left couplings only where directed.

For soldering or sweating joints on copper tube, clean and polish outer surface of tube and inner surface of fitting and use non-corrosive flux and 95-5 or better solder (except where silver solder is specified). Ream to remove burrs after cutting.

Screwed joints shall be American National Taper Pipe Thread, ANSI B2.1. All burrs shall be removed. Pipe ends shall be reamed out to size of bore and all chips shall be removed. Pipe joint cement shall be used on the male threads only.

Welded joints shall conform to the standards set forth in the ANSI B31.1 code for pressure piping.

Joints for plastic pipe shall be made in conformance with pipe manufacturer's recommendations.

754-3.2 EQUIPMENT PIPING

Provide water supply, gas, hot water, drain, vent, etc. connections to equipment as indicated on the Drawings or specified in other sections as requiring such services. Indicated locations and size of equipment connections are approximate only. The exact locations and sizes of piping, valves, etc. shall conform to approved shop drawings and printed installation directions furnished by equipment manufacturers. Connection sizes shall not be smaller than equipment outlets for same. Locate valves so as to make them easily accessible for maintenance and operation. All valves shall be line size.

Provide shut-off valves at all supply connections to all equipment hereinbefore referenced. Suppliers of equipment will provide rough-in drawings and the Contractor shall fully connect all items, supplying necessary piping and fittings as required unless otherwise specifically noted.

754-3.3 INSTRUMENTATION PIPING

All tubing shall be grouped in an orderly manner. All tubing and brass valves in tubing circuits shall be adequately supported. Care shall be taken to make sure tubing does not interfere with instrument access or removal.

All instrument tubing shall terminate at bulkhead fittings located in junction boxes or control panels. All transmitter lines which serve devices other than the primary receiver shall have an isolating valve in each branch. Where pressure switches for alarms are secondary devices, a plugged tee shall be installed between the isolating valve and the switches. Where two or more controlling instruments are served by a single transmitter, each shall have its own isolating valve.

Shutoff valves shall be installed to isolate instruments from air supply lines and signal lines. Shutoff valves shall not be installed in control lines from the instruments. A plugged tee shall be provided between each isolation valve and the instrument on signal lines to pressure switches, gauges, pressure recording or indicating instruments, etc., for calibration purposes.

All instrument tubing terminations shall be tagged with aluminum tags permanently secured and identified with the instrument identification tag number as indicated on the process and instrumentation drawings.

754-3.4 POLYETHYLENE WRAP

All ductile iron pipe (underground) shall be wrapped with sheets of tubular polyethylene. The polyethylene sheets shall be wrapped around the pipe with a minimum overlap of six inches (6") and sealed with black polyethylene tape.

All fittings and valves shall be encased in polyethylene wrap and shall be taped twice around. Cost of polyethylene wrap shall be included in price of ductile iron pipe, fittings, and valves (no direct pay).

754-3.5 SLEEVES

Sleeves shall be provided for all lines passing through floors, ceilings, and walls. The Contractor shall be responsible for the timely settings of all sleeves required for work under this section. Sleeves shall be of heavy gauge metal, carefully aligned with regard to elevation, etc., and shall be of such size as to allow fully insulated lines, if required, to pass through.

754-3.6 HANGING PIPE

Hangers shall be spaced as required to hold lines true without sags or humps but not more than 10 feet apart on 1-1/4" and larger pipe, not more than 8 feet apart on 3/4" and 1" pipe, and not more than 6 feet apart on 1/2" pipe or tubing. Horizontal runs of cast iron soil pipe shall be supported with hangers located at each bell.

All piping shall be kept clear of contact with any structural component and the Contractor shall be responsible for the correction of any objectionable vibration or noise transmission through piping systems installed under this section.

Where pipes are suspended, the hangers shall be attached to structural component with appropriate clamps and rods. Where lines are grouped in runs, angle iron or factory fabricated trapezes or bridges may be provided, suspending specified hangers therefrom. Lines shall not lay directly on trapezes. Perforated strap shall not be used for hangers.

Piping on roof shall be supported as detailed and at centers not to exceed the above. All vertical risers shall be supported at centers not to exceed the above hanger spacing.

Piping in chases at grouped fixtures (soil, waste, vent, and water) shall be supported from the floor at centers not to exceed 4'-0" with Unistrut channels and suitable Unistrut clamps (copper plated for copper lines). Vertical supports shall be connected together with two horizontal members located for maximum strength.

754-3.7 MINIMUM PRESSURE

At all times during the work, Contractor shall ensure that all portions of the potable water system being affected by the work shall be operated and maintained to provide a minimum positive pressure of 20 pounds per square inch (gauge) at all service connections. During construction, it is required to maintain this pressure for all parts of the distribution system not directly under construction.

754-3.8 TESTING

Pressure piping shall be tested as a condition of final acceptance of the work. All costs incidental to making such tests shall be borne by the Contractor.

Before any water main constructed under this Contract will be accepted, it shall pass a hydrostatic pressure test and a leakage test in accordance with AWWA Standard C605 and described herein. Pressure shall be measured at the lowest elevation under test. All air shall be expelled from the pipe prior to initiating any tests. Contractor shall make any temporary provisions for air removal which may be required for testing purposes at his own expense. All testing equipment, labor, and materials shall be furnished by the Contractor. Two pressure gauges shall be provided. One gauge shall be installed at the point of water/pressure supply, and the other gauge shall be installed at the opposite end of the section being tested. Gauges shall be liquid filled, protected against pulsation and vibration. Pressure rating of gauge shall be twice the test pressure and dial face shall be two inches minimum. Water used for testing shall be potable.

Testing pattern shall be arranged to limit the maximum allowable leakage to 800 gallons per 24 hours or less for the section under test. Test pressure shall be 150 psi unless noted otherwise.

Contractor shall furnish all testing equipment, materials, and labor. Contractor shall maintain test pressure for 24 hours. As a minimum, the Contractor, in the Engineer's presence, must confirm the current pressure and reestablish it to the test pressure after 2 hours, 4 hours, and 24 hours of testing time. The test pressure shall not be allowed to drop more than 5 psi at either the 2 hour or 4 hour interval; otherwise, test failure is indicated. Leakage, defined as the amount of water required to be added to the pipeline to maintain the specified test pressure, is limited to 10 gallons per 24 hours per mile of pipe for each inch of diameter (excluding service lines).

Should the test fail, Contractor shall locate and repair any defects at his cost. Cost of testing and repairing is to be included in the price bid per foot of pipe. Service line footage shall not be considered when calculating the allowable leakage.

754-3.9 DISINFECTION

All potable water supplies shall be protected to prevent contamination of the source during construction.

All potable water supplies shall be protected to prevent contamination of the source during construction. All new water distribution systems and repaired portions thereof, or extensions to existing systems shall be thoroughly disinfected as per AWWA Standard C 651 and Chapter XII of the State of Louisiana Sanitary Code. The entire cost of disinfection shall be included in the price bid for laying water mains.

Water shall be supplied from a temporary, backflow-protected connection to the existing distribution system or other approved source of supply shall be made to flow at a constant, metered rate into the newly installed water main. At a point not more than 10 ft downstream from the beginning of the new main, water entering the new main shall receive a dose of chlorine fed at a constant rate such that the chlorine dose applied to the water in the new main will be not less than 25 mg/L. To ensure that this concentration is provided, measure the chlorine concentration at regular intervals in accordance with the procedures described in the current edition of Standard Methods for the Examination of Water and Wastewater or AWWA Manual M12, or using appropriate chlorine test kits (see appendix A of the AWWA Standard).

Chlorine application shall not cease until the entire main is filled with heavily chlorinated water. The chlorinated water shall be retained in the main for at least 24 h, during which time all valves and hydrants in the treated section shall be operated to ensure disinfection of the appurtenances. At the end of this 24 h period, the treated water in all portions of the main shall have a residual of not less than 10 mg/L free chlorine. If at the end of the retention period, a chlorine residual of less than 10 mg/L of free chlorine is measured at any point of the line, the chlorination procedure shall be repeated.

After the retention period, heavily chlorinated water should not remain in prolonged contact with the pipe. In order to prevent damage to the pipe or other components, the heavily chlorinated water shall be flushed from the main until chlorine measurements show that the concentration in the water leaving the main is no higher than that generally prevailing in the distribution system or is acceptable for domestic use.

The environment into which the chlorinated water is to be discharged shall be inspected. If there is any possibility that the chlorinated discharge will cause damage to the environment, then a neutralizing chemical shall be applied to the water to be wasted to neutralize thoroughly the chlorine residual remaining in the water. Where necessary, federal, state, provincial, and local regulatory agencies should be contacted to determine special provisions for the disposal of heavily chlorinated water.

After the disinfection has been performed by the Contractor, the Contractor shall obtain and deliver water samples to the Louisiana Department of Health for a bacteriological analysis. Samples shall be collected every 1,200 ft of the new main (unless approved otherwise by the Engineer), plus one from the end of each dead-end line. The Contractor is responsible for all costs associated with taking the samples and delivering them to the appropriate lab. The Contractor shall submit copies of the results of the bacteriological testing to the Engineer. Water shall not be furnished for consumer's use until tests performed have shown the system to be free from contamination by coliform bacteria.

754-3.10 ADJUSTING & CLEAN-UP

Perform final field measurements of the Work as constructed and furnish record drawings of Field Changes with final locations of pipes, valves, services, hydrants, etc.

Complete all lists of defects or deficiencies, inspect all Work for conformance with Drawings and Specifications and verify such items as follows:

- Valves fully open.
- Sunken trenches refilled.
- Restoration of removed or damaged pavement.
- Proper orientation of fire hydrants.
- Hydrant bury line flush with finished surface.
- Existence of concrete pads and lids on valve boxes.
- Valve box and meter box lids flush with finished surface.
- Pressure reducing valves and altitude valves are properly adjusted.
- Erosion protection effective and seeding established.

754-4 MEASUREMENT & PAYMENT

When listed separately in the Bid Form, items will be measured and paid as a separate unit or lump sum price. Payment for unit price items will be for the actual amount or size installed. When no separate item is listed in the Bid Form, no separate measurement shall be made. The cost of Work not listed separately in the Bid Form shall be included in another item(s) to which it most nearly relates. Contractor's prices shall include all necessary costs to complete the Work in accordance with the Plans and Specifications.

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**TECHNICAL PROVISIONS
SECTION 757
SERVICE PUMP STATIONS**

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TECHNICAL PROVISIONS
SECTION 757
SERVICE PUMP STATIONS

757-1 GENERAL

757-1.1 SCOPE

This section governs materials, installation procedures and appurtenances for service pump stations and appurtenances.

757-1.2 UNITARY RESPONSIBILITY

In order to unify responsibility for proper operation of the complete pumping station, it is the intent of these Specifications that all system components be furnished by a single supplier (unitary source).

757-1.3 MANUFACTURER'S QUALIFICATIONS

Grinder pump stations, complete with all appurtenances, form an integral system, and as such, shall be supplied by a single grinder pump manufacturer. The Contractor shall be responsible for the satisfactory operation of the entire system. The equipment specified shall be the product of a Supplier experienced in the design and manufacture of grinder pumps for specific use in low pressure sewage systems. The Supplier shall submit detailed installation and user instructions for its product, submit evidence of an established service program including complete parts and service manuals, and be capable of maintaining a continuing inventory of grinder pump replacement parts. The Supplier must demonstrate to the satisfaction of the Engineer that the proposed pump station equipment will meet system flows and heads required.

The Supplier shall have at least 10 years of experience in the design and manufacture of units of identical size(s) and performance to the specified units. The Supplier must also have not less than 40 successful installations of low-pressure sewer systems utilizing grinder pumps of like type to the grinder pumps specified herein. An installation is defined as a minimum of 25 pumps discharging into a common force main which forms a low-pressure sewer system.

Pump stations shall be as manufactured by Barnes, or prior-approved equal.

757-1.4 SHOP DRAWINGS

After receipt of the Notice of Award, the Contractor shall furnish the Engineer a PDF of shop drawings from the manufacturer detailing the equipment or products to be furnished including dimensional data and materials of construction. The Engineer shall promptly review this data and return to the Contractor as approved, approved as noted, or rejected. Upon receipt of accepted shop drawings, the manufacturer shall proceed with order entry of the products and/or fabrication of the equipment.

757-2 MATERIALS

757-2.1 GENERAL

The Contractor shall furnish complete factory-built and tested grinder pump station(s), each consisting of a basin package, control panel, alarm device, unitized level control system, grinder pump and all necessary appurtenances to form a complete U.L. listed package system. Grinder pump shall be listed to U.L. 778 and CSA 108, basin package shall be listed to U.L. 1951, and control panel shall be listed to U.L. 508A. All equipment in the wet well shall be capable of constant submergence in sewage to a minimum depth of ten feet without electrical power being energized.

All materials exposed to wastewater shall have inherent corrosion protection: i.e., painted cast iron, fiberglass, stainless steel, PVC, CPVC.

757-2.2 OPERATING CONDITIONS

Pumps shall be centrifugal submersible grinder pumps designed to reduce all material found in normal domestic sewage, including plastic, rubber, sanitary napkins, and disposable diapers into a finely ground slurry. The temperature limitation of the liquid being pumped is 160 °F (71°C) intermittent and shall be capable of running dry for extended periods of time. Pump(s) shall be suitable for long term submergence in sewage. Grinder pump(s) shall be U.L. Listed to Standard 778 and CSA Listed to Standard 108.

In order to ensure proper operation in all conditions, pump(s) must provide, without overheating in continuous operation, maximum head condition required by the system. Pumps must also be capable of operating at zero or negative heads without damage to the pump or motor. Each pump shall be selected to perform under following operating conditions:

• Capacity (gpm)	15
• Total Dynamic Head (ft)	165
• Minimum Shutoff Head (ft)	195
• Maximum Pump Speed (rpm)	3,450
• Maximum Motor HP	2
• Motor Voltage	460V, 3Ø, 60 Hz

757-2.3 PUMP CONSTRUCTION

The volute, seal plates, and motor housing shall be constructed of high-quality ASTM A-48 class 30 cast iron. The pump(s) shall be painted with air dry enamel of 2 mil minimum thickness. All exposed hardware shall be 300 series stainless steel. Discharge connection shall be a standard 2.00 inch NPT in the vertical position.

The pump impeller shall be of the recessed, vortex design. Pumps with standard centrifugal semi-open impeller designs shall not be acceptable. The impeller shall be of 85-5-5-5 bronze construction and machined for threading to the motor shaft. The impeller shall be capable of being trimmed to meet specific performance characteristics.

The pump shall be a three-bearing design consisting of an upper ball bearing, an intermediate ball bearing restrained for the purpose of carrying the thrust loads, and an oil lubricated lower

bronze sleeve bearing to carry radial loads and prevent shaft deflection imposed by the pump impeller and grinder operation. The oil lubricated sleeve bearing shall be located between two mechanical seals. Lip type seals are not acceptable. Designs reducing the number of bearings or substituting sleeve bearings for ball bearings will not be considered equal.

The grinder mechanism shall be specifically designed for use in a grinder pump. Garbage disposal cutting mechanisms are not acceptable. The mechanism shall consist of a radial cutter threaded and locked on the motor shaft by a washer in conjunction with a counter sunk flat head cap screw, and a matching shredding ring. Grinding shall be accomplished by a slicing action as opposed to a chopping action. Chopping-type cutter mechanisms will not be allowed. Grinder design shall be able to alternately engage cutters at start and shall exert a minimum cutting force of 30 pounds, thus eliminating the need for excessive motors. The shredding ring shall be reversible to provide twice the cutting life. All grinding mechanism components, including both the shredding ring and radial cutter and its impeller (if required), shall be constructed of 440C stainless steel hardened to a minimum Rockwell C55 and shall be finish ground for a fine cutting edge. Two stage cutter mechanisms and/or those requiring external adjustment for proper clearance shall not be acceptable.

The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece, stainless steel motor shaft. The grinding assembly shall operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder shall be constructed so as to eliminate clogging and jamming under all normal operating conditions including starting. In order to demonstrate adequate flow velocity and grinding capability, the grinder pump shall be capable of passing a series of stringy type solids (diapers, rags, feminine products, etc.) through the pump without roping or winding the material in or immediately below the pump suction.

The grinder shall be capable of reducing all components in normal domestic sewage, including a reasonable amount of "foreign objects", such as paper, wood, plastic, glass, rubber and the like, to finely-divided particles which will pass freely through the passages of the pump and the discharge piping. The grinding mechanism must be capable of handling reasonable amounts of grit, often found in domestic sewage systems.

757-2.4 MOTORS

Single phase motors shall be of the capacitor start, capacitor run, NEMA L design and three phase motors shall be of the dual-voltage 240/480, NEMA B design. The motor shall be designed to be non-overloading throughout the entire pump curve. The motor shall be constructed with the open windings operating in a sealed housing, which contains clean dielectric oil for heat dissipation from the windings and for lubrication of the bearings, making it capable of operating in a totally, partially, or non-submerged condition for extended periods of time without damage due to heat being generated. Oil used must be able to be disposed of as non-hazardous waste. Air-filled motors shall not be acceptable. The rotor and stator assembly shall be of the standard frame design and secured to the pump seal plate by four threaded fasteners allowing for easy serviceability. Motor designs incorporating shrink or press fit assemblies between the stator and motor housing shall not be considered acceptable. The motor shaft shall be of 416 stainless steel.

Protection against excessive temperature shall be provided by heat sensor thermostat attached to the stator windings and connected in series with the contactor coil to the control panel.

The pumps shall be equipped with type SOW power cable. The power cable shall be connected to the motor via quick disconnect pin terminals. Threaded cord grip type cord entries are not acceptable. Pin receptacles shall be crimped and molded to the power cord in a PVC plug. The plug shall be secured with a stainless steel compression plate to prevent water from entering the motor housing and to provide strain relief at the point of cable entry. A stainless steel clamp shall compress the PVC molding against the cable jacket to prevent water from entering the jacket. A polybutylene terephthalate terminal block with brass pin inserts shall connect the power cord leads with motor leads. The ground pin shall be longer than the other pins such that the ground connection is the first connection made and the last connection broken when the plug is inserted and removed, respectively. A Buna-N O-ring shall provide isolation sealing between terminal block and the motor housing. The plug assembly shall be guaranteed by the manufacturer to meet UL approval for submersion.

757-2.5 MECHANICAL SEAL

The pump shall utilize a tandem mechanical shaft seal arrangement and shall operate in an oil atmosphere. Each seal shall be double floating, self-aligning rotary shaft seals to prevent leakage between the motor and pump. The materials of construction shall be carbon for the rotating face and ceramic for the stationary face, lapped and polished to a tolerance of one light band, with 300 stainless steel hardware, with all elastomer parts of Buna-N. The seal shall be commercially available and not a proprietary design of the manufacturer.

757-2.6 BASIN

The basin shall be fiberglass reinforced polyester resin with a 3" ballast support flange. The basin shall be furnished with one flexible inlet flange (shipped loose to facilitate field location) to accept a 4" schedule 40 PVC pipe. Inlet location can vary to accommodate ease of installation. Basin capacities and dimensions shall be as shown on the Drawings or as specified herein. The basin FRP wall laminate thickness shall vary with the wet well depth to provide the aggregate strength to meet the tensile and flexural physical property requirements. The basin FRP wall laminate must be designed to withstand wall collapse or buckling based on a hydrostatic pressure of 62.4 pounds per square foot, a saturated soil weight of 120 pounds per cubic foot, a soil modulus of 700 pounds per square foot. Basin must comply with the pipe stiffness values as specified in ASTM D 3753. The basin laminate must be constructed to withstand or exceed 150% of the assumed loading on any depth. The finished FRP laminate will have a Barcol hardness of at least 90% of the resin manufacturer's specified hardness for the fully cured resin. The Barcol Hardness shall be the same for both interior and exterior surfaces. Manufacture must submit documentation including calculation and production certification that basin (s) on the project are in compliance with the above requirements.

The basin package shall be furnished with factory pre-wired junction box. In case of groundwater flooding around grinder station location, the junction box shall be protected from such ground water. Junction box shall be NEMA 6 rated and mounted on the under side of the cover. The junction box and cover assembly shall be capable of providing adequate means of venting the basin. Cover shall be a molded polyethylene, grass green color.

Basin shall be UL Listed to Standard 1951.

757-2.7 PIPING

All discharge pipe shall be constructed of 300 Series Stainless Steel and terminate outside the bulkhead with a stainless steel, female NPT fitting. The manufacturer shall guarantee all bulkhead penetrations watertight.

All piping inside the basin silhouette shall be at a level in the station that is lower than the frost depth or depth of bury specified for the low-pressure sewer piping, whichever is lowest.

The pump shall be constructed with a positively primed flooded suction configuration. As added assurance that the pump cannot lose prime even under negative pressure conditions in the discharge piping system, the discharge piping system must include an anti-siphon capability. The design shall provide for a maximum bypass, under normal operating conditions, of no more than 1 GPM.

757-2.8 VALVES

The stainless steel pump discharge piping shall be equipped with factory installed gravity operated flapper-type check valve. Gravity operated ball type check valve shall not be permitted. This valve will provide a full ported passageway when open and shall introduce a friction loss of less than six inches of water at maximum rated flow. Working parts shall be made of 300 series stainless steel and non-wicking fabric reinforced neoprene flap to ensure corrosion resistance, repeatability, and dimensional stability. The valve body shall be powder-coated cast iron for corrosion resistance.

The station discharge shall be equipped with a factory installed, true union, manual ball valve. Ball valves shall be full ported, constructed of PVC, with a minimum rated pressure of 150 PSI. All valves shall be operable from ground level. Shut off valve must be replaceable without excavating basin exterior. Duplex station shall utilize two shut off valves, each equal to the size of the pump discharge.

Each basin package shall include one (1) Schedule 40 PVC type II swing check valve for installation in the service lateral between the grinder pump station and the low-pressure sewer main. Valves shall be 1.25 inch NPT and only require 1/2 pound of back pressure for complete closure.

757-2.9 LEVEL DETECTION

Level detection for controlling pump and alarm operation shall be accomplished by use of a detection mechanism specifically designed for use in a sewage grinder pump basin and shall be removable without the need to remove the pump. Switches utilized in the system shall be hermetically sealed in a submersible, watertight protective casing. Level detection mechanism shall be a Barnes "FloatTree™" type, or approved equal, designed to provide switch protection from solids, greases, oils, and fats. Level detection mechanism shall not require any regular, preventive maintenance. The level detection mechanism shall consist of three switches, one for each function (HIGH WATER ALARM, ON, and OFF functions). Switch assembly shall utilize an 18-5 cable, color coded leads. Switch assembly shall be 100% tested prior to shipment. The control assembly shall be part of the U.L.1951 listing. The level controls shall be serviceable without the need for a confined space entry as defined by OSHA or the need to remove the pump. Conventional suspending of mercury floats, mechanical, or swing arm floats for HIGH WATER ALARM, ON, and OFF functions will not be acceptable.

757-2.10 CONTROL PANEL

Each grinder pump station shall include a NEMA 4X, UL listed alarm panel suitable for wall or pole mounting. The NEMA 4X enclosure shall be non-metallic. The enclosure shall include a hinged, lockable cover with padlock.

The control panel shall include as a minimum: circuit breakers, fuses, terminal strip, ground lug, capacitors when required, generator receptacle, main service disconnect switch to isolate the panel from normal power source, motor starters, relays, alarm light and internal push to run button.

The control panel shall include the following features: external audible and visual alarm, push-to-run switch, and high level alarm capability. The audible alarm shall be capable of being silenced by means of an externally mounted push-to-silence button.

The visual alarm lamp shall be inside a red, oblong lens and shall be mounted to the top of the enclosure in such a manner as to maintain NEMA 4X rating. A minimum 90 dB audible device shall also be provided with a NEMA 4X silence button mounted on the exterior of the enclosure.

Control panels shall be mounted on property owner's wall unless, at the discretion of the Engineer and property owner, it is required to mount the control panel on rack as detailed on the Drawings. The control panel shall be mounted within a distance from the pump necessary to install cable(s) furnished by equipment Supplier.

757-2.11 FACTORY WIRING

All wiring in the grinder pump station shall be installed and functionally tested prior to shipment from the factory. As a minimum requirement, all wire connections inside the basin wet well must be completed during factory assembly and 100% functionally tested prior to shipment. This includes all control panel connections. All electrical wires penetrating or passing through the silhouette of the pump station must be guaranteed to be watertight by the manufacturer and must be installed at the factory prior to shipment. No junctions, plugs, electrical quick disconnects (EQD's) etc. will be allowed between the pump motor housing and the junction box, nor junction box and control panel. Direct burial electrical cable must be factory installed in the station and arrive at the job site with a minimum length of fifty (50) feet external to the station ready to unroll and connect to power source and control panel. Consult factory for other available lengths. Factory wiring and testing shall be a specific part of the UL listing.

757-2.12 PUMP & LEVEL CONTROL REMOVAL SYSTEM

Each basin shall be equipped with a 300 series stainless steel "C" channel rail assembly to facilitate removal of the pump(s) and level control(s) from ground level. A 1/2" diameter knotted polypropylene rope with a breaking strength of 3,780 lbs. shall be supplied for pump removal and 1/4" diameter knotted polypropylene rope with a breaking strength of 1200 lbs. shall be supplied for level control removal. Removal system must not require the loosening of fasteners to facilitate removal of pump or level control and shall provide for automatic alignment and re-connection of discharge piping for the replacement pump and correct height location for level control. Pump and level control replacement shall be accomplished while the basin is full of sewage without the need to de-water the basin.

757-2.13 SAFETY

The Grinder Pump Station shall be free from electrical and fire hazards as required in a residential environment. As evidence of compliance with this requirement, the completely assembled, factory wired and tested grinder pump station assembly shall be U.L. listed. Grinder pump stations not U.L. listed will not be acceptable.

757-2.14 FACTORY TEST

Each grinder pump shall be submerged, operated and tested for performance compliance to its respective curve. Testing process and periodic inspection of testing process shall be conducted and approved by U.L.

757-3 **INSTALLATION**

757-3.1 EXAMINATION

Contractor shall off-load materials and equipment at installation site using equipment of sufficient size and design to prevent injury or damage. Material/equipment manufacturer shall provide written instruction for proper handling. Immediately after off-loading, Contractor shall inspect all components and appurtenances for shipping damage or missing parts. Any damage or discrepancy shall be noted in written claim with shipper prior to accepting delivery. Validate all equipment serial numbers and parts lists with shipping documentation. Notify the manufacturer's representative of any unacceptable conditions noted with shipper.

757-3.2 INSTALLATION

Earth excavation and backfill are specified under Sections 203 and 205 of the Technical Provisions, including any necessary sheeting and bracing. The Contractor shall be responsible for handling groundwater to provide a firm, dry subgrade for the structure and shall guard against flotation or other damage resulting from general water or flooding. The grinder pump stations shall not be set into the excavation until the installation procedures and excavation have been approved by the Engineer.

Grinder pump station equipment and all appurtenances shall be installed per the Supplier's installation instructions. Two (2) copies of the Supplier's installation instructions shall be furnished to the Owner.

It shall be the responsibility of the Contractor to coordinate with the Owner and individual property owner to determine the optimum location for the alarm panel.

All restoration shall be the responsibility of the Contractor. The properties shall be restored to their original condition.

Check motor and control data plates for compatibility to site voltage. Install and test the station ground prior to connecting line voltage to station control panel. Prior to applying electrical power to any motors or control equipment, check all wiring for tight connection. Verify that protective devices (fuses and circuit breakers) conform to project design documents. Manually operate circuit breakers and switches to ensure operation without binding. Open all circuit breakers and disconnects before connecting utility power. Verify line voltage, phase sequence and ground before actual start-up.

757-3.3 MANUFACTURER'S START-UP SERVICES

Prior to Substantial Completion of the project, the grinder pump station Supplier shall provide the services of qualified factory-trained technician(s) who shall inspect the placement and wiring of each station, perform field tests as specified herein, and instruct the Owner's personnel in the operation and maintenance of the equipment.

All equipment and materials necessary to perform testing shall be furnished by the Contractor. This includes, as a minimum, a portable generator and power cable (if temporary power is required), water in each basin (filled to a depth sufficient to verify the high level alarm is operating), and opening of all valves in the system. These steps shall be completed prior to the qualified factory-trained technician(s) arrival on site.

Upon completion of the installation, the authorized factory technician(s) will perform the following test of each station:

1. Make certain the discharge shut-off valve in the station is fully open.
2. Turn ON the alarm power circuit and verify the alarm is functioning properly.
3. Turn ON the pump power circuit. Initiate the pump operation to verify automatic "on/off" controls are operative. The pump should immediately turn ON.
4. Consult the Supplier's service manual for detailed start-up procedures.

Upon completion of the start-up and testing, the Contractor shall submit the results of the tests performed for each grinder pump station. Final payment will not be made until test results have been received for each pump station and any and all installation deficiencies have been corrected.

757-3.4 CLEANING

Prior to acceptance, inspect interior and exterior of pump station for dirt, splashed material or damaged paint. Clean or repair accordingly. Remove from the job site all tools, surplus materials, scrap and debris.

757-3.5 MANUFACTURER'S WARRANTY

The pump station manufacturer shall warrant all equipment to be of quality construction, free of defects in material and workmanship for a minimum period of one year after the date of Substantial Completion.

757-3.6 O&M MANUALS

The manufacturer shall provide O&M manuals in PDF format. Documentation shall be specific to the pump station supplied and collated in functional sections. Each section shall combine to form a complete system manual covering all aspects of equipment supplied by the station manufacturer. Support data for any equipment supplied by others, even if mounted or included in overall station design, shall be provided by those supplying the equipment.

757-4 **MEASUREMENT & PAYMENT**

Unless specifically listed in the Bid Form, separate payment will not be made for the materials and works described in this section. Their cost will be included in the particular unit or lump sum prices in the Bid Form to which they most nearly relate.

**TECHNICAL PROVISIONS
SECTION 758
CHLORINATION SYSTEM**

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TECHNICAL PROVISIONS
SECTION 758
CHLORINATION SYSTEM

758-1 GENERAL

758-1.1 SCOPE

Under this section of the Specifications, the Contractor shall furnish and install a complete chlorine residual monitoring system including all required piping and electrical connections to make a complete and working system.

The monitoring system shall be furnished as a complete functional system with all equipment required to provide a functional and reliable system that meets all current industry standards.

758-1.2 QUALIFICATIONS

All Work under this section of the Specifications shall be performed by a subcontractor experienced in the installation, startup, and operation of chlorine residual monitoring systems for drinking water applications.

758-1.3 SHOP DRAWINGS

After receipt of the Notice of Award, the Contractor shall furnish the Engineer a PDF of shop drawings from the manufacturer detailing the equipment or products to be furnished including dimensional data and materials of construction. The Engineer shall promptly review this data and return to the Contractor as approved, approved as noted, or rejected. Upon receipt of accepted shop drawings, the manufacturer shall proceed with order entry of the products and/or fabrication of the equipment.

758-2 MATERIALS

758-2.1 PIPING

Water and chlorine solution piping shall be sized as shown on the Drawings and all piping shall as indicated on the Drawings.

PVC piping shall be Sch. 80, conforming to ASTM D 1785 for pipe and ASTM D 2467 for fittings.

Valves shall be PVC with teflon (TFE) seats and Viton O-ring seal equal to Celanese Piping Systems, Inc., Louisville, KY.

Where threaded joints are required, use teflon (TFE) tape on the male threads. PVC solvent cement shall conform with ASTM D 2564.

758-2.2 CHLORINE RESIDUAL ANALYZER

The Contractor shall furnish and install one complete chlorine analyzer for measuring free chlorine residual in the treated water. Each chlorine analyzer shall consist of a direct measuring chlorine sensor, a clear constant-head flowcell, sensor interconnect cable with quick disconnect plug, and an electronic monitor housed in a NEMA 4X enclosure suitable for wall or panel mounting.

The chlorine sensor shall be a direct measuring polarographic sensor utilizing a special polymeric membrane to isolate the sensing electrodes from the sample and eliminate the potential for electrode contamination. The membrane shall allow chlorine to diffuse into the sensor where it shall react with the sensing electrode, generating a signal that is linearly proportional to the chlorine concentration. The sensor assembly shall also contain a precision RTD temperature sensor to continuously measure sample temperature to allow temperature compensation of the measured chlorine value. The chlorine sensor shall be constructed with a quick disconnect receptacle to allow easy sensor servicing or exchange. Chlorine sensors shall be supplied complete with at least 10 spare membranes, electrolyte, and a spare parts kit that includes all O-rings and special hardware.

The flowcell assembly supplied with the analyzer shall be constructed of clear material allowing the condition of the sensor membrane to be inspected without removal of the sensor. The sensor shall slide easily into the side of the flowcell, with a double O-ring seal to prevent water leakage. Flow to the sensor shall be regulated automatically through a constant-head overflow arrangement. Hose barbs for sample inlet (1/4" I.D. tubing) and drain (1/2" I.D. tubing) shall be supplied as part of the flowcell.

The instrument shall be powered by 120 VAC single-phase line power and shall provide a 4-20 mA output representing chlorine residual.

The chlorine analyzer electronic assembly shall provide a variety of functions as follows.

1. Provide user selectable display of PPM chlorine, process temperature, or PID % output on the main display. Main display variable shall be indicated with a minimum character height of 0.75" to allow easy readability up to 20 feet away.
2. Allow selection of operating ranges of 0-200 PPB, 0-2 PPM, 0-20 PPM, or 0-200 PPM. Display ranges shall be configurable by operators, or the monitor may be configured for Auto-Ranging. The auto-ranging function shall automatically switch to the display range that provides the best resolution for any given operating level.
3. Provide the ability to use the 4-20 mA output for PID control. Proportional, Integral, and Derivative functions shall be user adjustable, and also provide for output hold when needed.
4. Provide output hold and output simulate functions to allow for testing or remote receiving devices or to allow maintenance without disturbing control systems.
5. Diagnostic functions shall be incorporated into the transmitter. The 4-20 mA output shall be capable of being assigned to safely rise to 20 mA, fall to 4 mA, or be left alone, during diagnostic failures. Diagnostic error messages shall be displayed in clear language; no confusing error codes shall be displayed.

The complete chlorine analyzer shall be supplied with spare parts and accessories for up to 2 years of operation. A minimum of 10 replacement membranes shall be supplied for the sensor.

Chlorine analyzers shall be Series Q46H/62-63 as manufactured by Analytical Technology, Inc. or approved equal.

758-3 INSTALLATION

758-3.1 EXAMINATION

Contractor shall off-load materials and equipment at installation site using equipment of sufficient size and design to prevent injury or damage. Material/equipment manufacturer shall provide written instruction for proper handling. Immediately after off-loading, Contractor shall inspect all components and appurtenances for shipping damage or missing parts. Any damage or discrepancy shall be noted in written claim with shipper prior to accepting delivery. Validate all parts lists with shipping documentation. Notify the manufacturer's representative of any unacceptable conditions noted with shipper.

758-3.2 INSTALLATION

Installation shall be in strict accordance with the manufacturer's instructions and recommendations in the locations shown on the Drawings. Installation shall include furnishing the required fittings, connections, appurtenances, chemicals, and other incidentals for initial operation. The grades of all equipment and incidentals furnished shall be in accordance with the manufacturer's recommendations. Wiring shall be per manufacturer's recommendations.

Supply all anchor bolts, temporary equipment, power, water, labor, and all other incidentals required for the proper installation of the equipment.

758-3.3 PIPING INSTALLATION

Aboveground lines shall be insulated for protection against freezing.

Provide pipe hangers and supports as required.

Make solvent cement joints in compliance with ASTM D 2855, Recommended Practice For Making Solvent Cemented Joints With PVC Pipe and Fittings.

The exterior of exposed PVC piping shall be cleaned with acetone, rinsed, dried, and painted with two coats of polyurethane or epoxy paint as specified under paints and painting.

Clean all PVC piping by swabbing and flushing with potable water. Disconnect equipment and valves from piping system and perform hydrostatic pressure test to 150 psi and repair any leaking joints.

758-3.4 STARTUP

After all equipment has been completely installed, and working under the direction of the manufacturer, conduct in the presence of the Engineer, such tests as are necessary to indicate that equipment performance conforms to the Specifications. Field tests shall be performed for all equipment under this section. Supply all electrical power, water, labor, equipment, and incidentals required to complete this field test.

Contractor shall be responsible for startup of all equipment furnished under this section of the Specifications. Contractor shall demonstrate that all system components are working and shall adjust the system to provide the required output. Startup shall include a minimum of one working day to instruct representatives of the Owner on proper operation and maintenance of the equipment.

758-3.5 O&M MANUALS

The Contractor shall a PDF of operation and maintenance manuals containing complete information on the assembly, operation, adjustment, maintenance, and repair of the equipment, together with detailed parts lists, drawings, and photographs.

758-4 MEASUREMENT & PAYMENT

When listed separately in the Bid Form, items will be measured and paid as a separate unit or lump sum price. Payment for unit price items will be for the actual amount or size installed. When no separate item is listed in the Bid Form, no separate measurement shall be made. The cost of Work not listed separately in the Bid Form shall be included in another item(s) to which it most nearly relates. Contractor's prices shall include all necessary costs to complete the Work in accordance with the Plans and Specifications.

**TECHNICAL PROVISIONS
SECTION 805
STRUCTURAL CONCRETE**

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TECHNICAL PROVISIONS
SECTION 805
STRUCTURAL CONCRETE

805-1 GENERAL

805-1.1 DESCRIPTION

This work consists of furnishing, placing, finishing, and curing Portland cement concrete in structures in accordance with these specifications and conforming to the lines, grades and dimensions shown on the Drawings. All concrete placed as part of this Contract shall be in conformance with this section unless expressly noted otherwise in Drawings or Specifications.

805-1.2 SUBMITTALS

Submit the proposed concrete mix design(s), with supporting historical testing data in accordance with ACI 318 Section 5.3.2 "Required average strength", for each strength and/or slump requirement indicated on Contract Documents for review by an independent testing laboratory at least 5 days prior to use. When a concrete production facility does not have field strength test records meeting the requirements of ACI 318 Section 5.3.1 "Sample Standard Deviation" as referenced by ACI 318 Section 5.3.2 "Required average strength", the required average strength shall meet or exceed the strength requirements of Table 5.3.2.2.

Submit manufacturer's descriptive literature and application recommendations for proprietary items, including admixtures, patching compounds, repair compounds, bonding adhesives, bonding agents, water stops, joint systems, curing compounds, dry-shake finish materials, reinforcement, forming accessories, non-shrink grout, and all other similar items that are specified within the Contract Documents.

Submit concrete reinforcement Shop Drawings indicating reinforcement bar size, grade, length, placement, etc. Drawings shall show bar arrangement, provide schedules, diagrams of bent bars and any special reinforcement required at openings or penetrations in concrete structures. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, bent bar diagrams, and arrangement of concrete structures. Details of bar supports and spacers shall be included.

805-2 MATERIALS

805-2.1 CONCRETE SCHEDULE

Concrete classes shall be as called for on the Drawings or specified elsewhere and shall conform to the following table. All structural concrete for foundations, boxes, manholes, etc. shall be Class A, 4,000 psi 28 day compressive strength unless noted otherwise.

Class	Required 28 Day Compressive Strength	Minimum Cement Content	Maximum Water/ Cement Ratio	Slump	
				Vibrated	Non-Vibrated
	(psi)	94 lb sk/cy	lb./lb.	(in.)	(in.)
A	4,000	6	0.53	2-4	2-5
B	3,500	5-1/2	0.58	2-4	2-5
C	3,000	5	0.58	2-4	2-5
D	2,500	4-1/2	0.62	2-4	2-5
E	2,000	4	0.70	1-3	2-5

Cement contents are minimum values. Adjustments from this table necessary due to aggregate requirements, admixtures, etc., shall not result in a cement decrease nor result in any increase in compensation to the Contractor. Unless noted otherwise on the Drawings, the Contractor may substitute a maximum of 15% fly ash (by weight) for the cement required in the previous table.

805-2.2 CEMENT

Cement shall comply with ASTM C150 Standard Specifications for Portland Cement, Type I or Type II, unless otherwise indicated. Pozzolan blended cement shall not be used.

805-2.3 AGGREGATES

Concrete aggregates shall conform to the Standard Specifications for Concrete Aggregates, ASTM Designation C-33, except that aggregates failing to meet these specifications, but which have been shown by special test or actual service to produce concrete of the required quality, may be used where approved by Engineer.

Aggregate, both fine and coarse, shall be so stored as to avoid the inclusion of foreign materials. Fine aggregate and coarse aggregate shall be stored in separate piles. Division bulkheads shall be used, if necessary, in order to prevent adjacent piles from overlapping. All aggregates shall be handled and stored in such a manner as to prevent size segregation. When segregation is apparent, the aggregate shall be re-mixed. At the time of its use, the aggregate shall be free of frozen materials.

Aggregates shall be limited in size to the smaller of:

1. 1-1/2"
2. One-sixth (1/6) of clear distance between forms for reinforced concrete.
3. One-fifth (1/5) of clear distance between forms for non-reinforced concrete.
4. Three-fourths (3/4) of the smallest clear spacing between reinforcement and other objects (e.g. other reinforcement, forms, etc.).

805-2.4 WATER

Water shall be potable.

805-2.5 ADMIXTURES

Except for admixture(s) which are specifically required in these specifications, any proposed admixture(s) shall be approved in writing by the Engineer prior to construction. Reductions in cement content will not be permitted. Admixtures containing chloride ions, or other ions having a harmful effect, shall not be used where concrete is in contact with aluminum or zinc-coatings, where concrete is to be sulfate-resistant, or where concrete will be prestressed. Any admixture must conform to the following requirements:

1. AIR-ENTRAINING ADMIXTURE: ASTM C-260, C-226, C-150. Unless specified otherwise on the drawings, provide an air entraining admixture to achieve an air content of 5% +/- 1% by volume.
2. ACCELERATING AGENT: Calcium chloride conforming to ASTM D 98, Type 1 or Type 2. Use and amount shall be subject to approval.
3. OTHER ADMIXTURES: Admixture other than air-entraining agent and accelerating agent shall conform to ASTM C494 and shall be compatible with the mix at job temperatures.
4. STORAGE: Admixtures shall be protected from freezing, settling and dampness. Deteriorated materials shall not be utilized.

805-2.6 REINFORCING STEEL

Various reinforcing systems as shown in the Drawings shall conform to the following and other sections of these specifications, as applicable.

1. BARS: Reinforcing steel bars shall be of the size specified conforming to ASTM A 615 (Billet-Steel deformed) or ASTM A 617 (Axle steel deformed). Bars shall be deformed and be Grade 60.
2. WELDED STEEL WIRE FABRIC: Mesh reinforcement shall meet ASTM Designation A 185. Size shall be as shown and called for on Drawings.
3. TIE-BARS: Tie bars shall conform to identical standards of the reinforcement bars (i.e. ASTM A 615, A 617, Grade 60).

805-2.7 WATERSTOP

All waterstop shall be PVC and meet Corps of Engineers specifications CRD C572 and USDA, 565 Specification 140. Splices shall be thermally welded. Waterstop shall be ribbed dumbbell type of the size specified.

805-3 INSTALLATION

805-3.1 COORDINATION & PLACEMENT OF EMBEDDED ITEMS

Full coordination with other trades shall be provided by the Contractor to assure proper setting and provisions for embedded items. Embedded items shall have been inspected and tested as applicable prior to concrete placement.

Miscellaneous embedded items not specifically mentioned herein but which are indicated on the plans or are required for a complete job shall be provided and installed.

Positive methods shall be used in placing the inserts and embedded items to keep them in correct position during placing of concrete.

805-3.2 TESTING

Laboratory services shall be performed by a commercial laboratory selected by the Engineer, approved by the Owner, and paid by the Owner. Contractor and/or supplier shall give the Owner full access to placement site and production site for purpose of quality control. The laboratory shall be allowed to inspect and test all materials entering concrete, analyze aggregate for quality, durability, grading, and free water content, take representative specimens of ingredients and mixes, and make test cylinders and measure compressive strength of same. Provisions shall be made to have batch plant and job site access for laboratory control. Job site laboratory control shall include job mixing, handling, and placing of concrete.

All test specimens shall be taken, and laboratory tests conducted in conformance with the latest standard test procedure of the ASTM. Above-described tests are for the Owner's benefit, not intended for reliance on by the Contractor. Contractor is responsible for his own quality assurance.

Unless otherwise required, a minimum of five (5) 6" by 12" cylinders will be made for each 50 cubic yards of concrete, or for each day's pour, if the amount poured in a day is less than 50 cubic yards. Of each set of test cylinders, one (1) will be tested for compressive strength at the age of three (3) days; two (2) will be tested for compressive strength at the age of seven (7) days; and two (2) will be tested at the age of twenty-eight (28) days.

It shall be the responsibility of the Contractor to produce concrete of the strength, durability, workability, and finish specified, furnish the mix design, furnish representative material for specimens in quantities required by the testing laboratory; cooperate and assist in taking samples of materials for testing. Failure to produce the specified product may result in the product's complete removal and replacement at the Contractor's expense. Any tests taken at the Contractor's request shall be at his expense, regardless of test results.

805-3.3 REINFORCEMENT

Reinforcement shall be fabricated and placed as indicated with alignment true with the Drawings. Reinforcement detailing and placement, including concrete protection for steel reinforcement, unless otherwise indicated, shall conform to ACI 318 and 315.

Reinforcement shall be free of loose, flaky rust, mill scale, or coating, including ice, and any other foreign substance interfering with the bond. Reinforcing steel shall not be aligned in a manner injurious to the steel or concrete.

Heating to bend or straighten bars shall require prior approval. Bars may be moved as necessary to avoid interference with other embedded items. If bars are moved more than one bar diameter, the resulting arrangement of bars including additional bars necessary to meet structural requirements shall be approved by the Engineer before concrete is placed.

Reinforcing steel shall not be spliced at points of maximum stress unless otherwise indicated. Laps or splices shall be made in conformance with ACI 318.

Exposed reinforcement bars, inserts, and plates intended for bonding with future extensions shall be protected from corrosion and inspected and cleaned prior to placement of concrete.

Tie bars shall be accurately aligned parallel to the finished surface and shall be rigidly held in place and supported during placing of the concrete.

805-3.4 FORMS

Forms shall be of wood or other approved material, built mortar tight, and of sufficient rigidity to prevent distortion due to pressure of concrete and other loads incident to construction operations. Forms shall be constructed and maintained to prevent warping and opening of joints due to shrinkage of lumber.

Forms shall be substantial and unyielding and so designed that finished concrete will conform to proper dimensions and contours. Design of forms shall take into account the effect of vibration of concrete as it is placed.

Forms for exposed surfaces shall not adhere to or discolor concrete, shall be made of either moisture resistant concrete form plywood, dressed lumber, or metal lined with concrete form plywood. Forms shall be approved by the Engineer. Forms for reentrant angles shall be chamfered and forms shall be filleted at sharp corners. Forms for projections, such as girders or copings, shall be given a bevel or draft to ensure easy removal. Chamfer strips shall be mill cut, triangular, dressed on all faces, and shall be 3/4" (measured on the sides) unless directed otherwise. All exposed edges shall be chamfered unless expressly noted otherwise on the Drawings.

When possible, forms shall be daylighted at intervals not greater than 10 feet vertically, the openings being sufficient to permit free access for inspecting, working, and spading the concrete.

Metal ties or anchorages within forms shall be constructed to permit their removal to a depth of at least one inch from the face without damage to concrete. If ordinary wire ties are permitted, upon removal of the forms, wires shall be cut back at least 1/4 inch from the face of concrete with chisels or nippers; only nippers shall be used for green concrete. Fittings for metal ties shall be of such design that, upon their removal, cavities left will be of the smallest possible size. Cavities shall be filled with cement mortar and the surface left sound, smooth, even and uniform in color.

Forms shall be set and maintained reasonably true to required line and grade until concrete is sufficiently hardened. When forms appear to be unsatisfactory, either before or during placing of concrete, the work shall be stopped until defects have been corrected. Forms shall be so designed that portions can be removed without disturbing portions of forms to be removed later and, as far as practicable, so that form marks will conform to general lines of the structures. For narrow walls and columns, the bottom shall be left loose so that they may be removed for cleaning out extraneous material immediately before placing concrete.

Shape, strength, rigidity, mortar-tightness, and surface smoothness of re-used forms shall be maintained. Any warped or bulged lumber must be resized before being re-used. Unsatisfactory forms shall not be re-used.

Prior to placing concrete, the interior of forms shall be cleaned of dirt, sawdust shavings or other debris. Forms shall be inspected immediately prior to placing concrete. Forms shall be treated with a form release agent and saturated with water immediately before placing concrete. Release agents which will adhere to or discolor concrete shall not be used.

Cleaned ports shall be provided to the top surface of concrete where a stoppage of placing occurs.

805-3.5 MIXING

The concrete shall be mixed until there is uniform distribution of the materials and shall be discharged completely before the mixer is recharged.

For job-mixed concrete, the mixer shall be rotated at a speed recommended by the manufacturer, and mixing shall be continued at least one minute and 30 seconds after all materials are in the mixer.

Ready-mixed concrete shall be mixed and delivered in accordance with the requirements set forth in the Standard Specifications for Ready-Mixed Concrete, ASTM Designation C-94.

The following time intervals between mixing and placing apply:

1. Stationary Mixers – Non agitating Transport: 45 minutes
2. Truck Mixed - Agitating Transport: 60 minutes, or 45 minutes when temperature exceeds 80° F
3. Site Mixed (Site concrete placement): 90 minutes

805-3.6 HANDLING AND PLACING CONCRETE

In preparation for placing concrete, all sawdust, chips and other construction debris, water, and extraneous matter shall be removed from the interior of forms. Struts, stays and braces serving temporarily to hold forms in concrete shall be removed from the forms when concrete placing has reached an elevation rendering their service unnecessary. Placing concrete shall not be permitted when weather or Contractor's facility limitations prevent proper concrete finishing or curing.

Concrete shall be placed as to avoid segregation of materials and displacement of reinforcement. The use of long troughs, chutes, and pipes for conveying concrete from mixer to forms will be permitted only with written authorization. If inferior concrete is produced by the use of such devices, the Engineer may order discontinuance of their use and the institution of a satisfactory method of placing.

Unless otherwise permitted, open troughs and chutes shall be metal or metal lined. Where steep slopes are required, chutes shall be equipped with baffles or be in short lengths that reverse the direction of movement of concrete.

Chutes, troughs, and pipes shall be kept free from coatings of hardened concrete by thoroughly flushing with water after each pour. Water for flushing shall not be discharged within the structures. No aluminum alloy material will be allowed.

When placing operations involve dropping concrete more than 5 feet, it shall be deposited through sheet metal or other approved tremie except where deemed impractical by the Engineer. After initial set of the concrete, forms shall not be jarred and no strain shall be placed on the ends of reinforcement bars which project from freshly poured concrete.

Concrete, when placed, shall have a temperature of not less than 50°F nor more than 100°F, nor shall it be placed with a freeze predicted within 24 hours.

Concrete, during and immediately after depositing, shall be thoroughly consolidated. Consolidation shall be done by mechanical vibration subject to the following provisions:

1. Vibration shall be internal unless authorization for other methods is obtained or as provided herein.
2. Vibrators shall be of an approved type and design, capable of transmitting vibration to concrete at frequencies of not less than 7,000 impulses per minute.
3. Intensity of vibration shall be such as to visibly affect concrete over a radius of at least 18 inches.
4. The Contractor shall provide a sufficient number of vibrators to properly consolidate each concrete batch immediately after it is placed. Spare units shall be on site and immediately available for use.
5. Vibrators shall be manipulated so as to thoroughly work concrete around reinforcement and embedded fixtures and into corners and angles of forms.
6. Vibration shall be applied at the point of deposit and in the area of freshly deposited concrete. Vibrators shall be inserted and withdrawn from the concrete slowly. Vibration shall be of sufficient duration and intensity to thoroughly compact concrete but shall not be continued so as to cause segregation. Vibration shall not be continued at any one point to the extent that localized areas of grout are formed. Depth of vibration should extend into the underlying layer of fresh concrete to weld the two strata.
7. Application of vibrators shall be at points uniformly spaced and not farther apart than twice the radius over which vibration is visibly effective.
8. Vibration shall not be applied directly to or through reinforcement to sections or layers of concrete which have hardened to the degree that concrete ceases to be plastic under the vibration. It shall not be used to make concrete flow. Vibrators shall not be used to transport concrete in forms.
9. Vibration shall be supplemented by such spading as necessary to ensure smooth surfaces and dense concrete along form surfaces and in corners and locations inaccessible to vibrators.
10. These provisions for vibration shall apply to filler concrete for steel grid floor except that the vibrator shall be applied to the steel.
11. These provisions for vibration shall also apply to precast piling, concrete cribbing, and other precast members except that, if approved, the manufacturer's methods of vibration may be used.

Concrete shall be placed in horizontal layers not more than 12 inches thick unless otherwise permitted. When less than a complete layer is placed in one operation, it shall be terminated at a vertical bulkhead. Each layer shall be placed and consolidated before the preceding batch has taken initial set to prevent damage to green concrete and avoid surfaces of separation between batches.

When placing of concrete is temporarily discontinued, the concrete, after becoming firm enough to retain its form, shall be cleaned of laitance and other objectionable material to a sufficient depth to expose sound concrete. The top surface of concrete adjacent to forms shall be finished to a 2-inch grade strip.

Where a featheredge might be produced at a construction joint, as in the sloped top surface of a wingwall, an inset form work shall be used to produce a blocked-out portion in the preceding layer which shall produce an edge thickness of not less than 6 inches in the succeeding layer. Work shall not be discontinued within 18 inches of the top of any face, unless provision has been made for a coping less than 18 inches thick, in which case, if permitted, the construction joint may be made at the underside of the coping.

Immediately following the discontinuance of placing concrete, accumulations of mortar splashed on reinforcement steel and form shall be removed. Dried mortar chips and dust shall not be mixed in fresh concrete. If accumulations are not removed prior to the concrete reaching initial set, care shall be exercised not to damage or break the concrete-steel bond while cleaning reinforcement steel.

Concrete in slab spans shall be placed in one continuous operation for each span unless otherwise directed.

805-3.7 PUMPING

Pumping equipment shall be so arranged that no vibrations result which damage freshly placed concrete. Pipes carrying concrete to placing area shall be laid out with a minimum of bends and not unauthorized change in size. Where concrete is conveyed and placed by mechanically applied pressure, suitable equipment of adequate capacity shall be used. Aluminum piping will not be permitted.

A grout mortar, or concrete with coarse aggregate omitted, shall be pumped through the equipment ahead of the regular concrete to provide lubrication to start pumping operations. This material shall not be used in placement. The lubrication process need not be repeated as long as pumping operations are continuous.

Operation of the pump shall be such as to provide a continuous stream of concrete without air pockets. When pumping is completed, concrete remaining in the pipeline, if it is to be used, shall be ejected in such manner that there will be no contamination of concrete or separation of ingredients.

Contractor must submit a written plan of operation prior to being allowed to pump concrete. This plan must indicate provisions to prevent formation of cold joints in the event of a disruption in conveying concrete.

805-3.8 CONSTRUCTION JOINTS

Construction joints shall be made only where shown on the Drawings or shown on the pouring schedule, as approved by the Engineer. If not detailed on the Drawings, construction joints shall be placed as directed. Raised shear keys or reinforcing steel shall be used where necessary to transmit shear or bond sections together. Horizontal beams shall not connect to a wall, column, or beam by a joint in shear.

Forms shall be retightened before placing new concrete on or against hardened concrete. Joints shall be made using one of the two methods described below, and as approved by the Engineer.

1. Mortar Joints: The surface of hardened concrete shall be roughened as required in a manner that will not leave loosened particles of aggregate or damaged concrete at the surface, thoroughly cleaned of foreign matter and laitance, and saturated with water. To

ensure an excess of mortar at the juncture of hardened and newly deposited concrete, the surfaces, including vertical and inclined surfaces, shall be thoroughly coated with mortar or neat cement grout. New concrete shall be placed before the grout has attained its initial set. Placing of concrete shall be carried continuously from joint to joint. Edges of joints which are exposed to view shall be finished true to line and elevation.

- 2. Epoxy Joints: Vertical surfaces of deck construction joints and other construction joints shall be coated prior to each succeeding pour with an approved epoxy adhesive applied according to manufacturer's recommendations. Surfaces of hardened concrete to which new concrete is to be bonded shall be cleaned of foreign material and loose and unsound concrete by sandblasting, hammers, or wire brushes. Grease or oil present shall be removed with a detergent wash such as trisodium phosphate and the entire area washed with fresh water and brushed with a stiff brush. If a detergent is not required, dust and small particles not removed by other cleaning methods shall be removed by washing.

805-3.9 CONCRETE EXPOSED TO SEA WATER

Concrete shall be mixed for 2 minutes and the water content of the mixture shall be carefully controlled to produce concrete of maximum impermeability. Concrete shall be thoroughly consolidated, and stone pockets shall be avoided. No construction joints shall be formed between levels of extreme low water and extreme high water as determined by the Engineer. Between these levels, sea water shall not come in contact with concrete for at least 30 days. Concrete surfaces shall be left undisturbed after form removal.

805-3.10 CURING

A curing period shall be provided as indicated below during which time the concrete shall be protected from moisture loss, rapid temperature change, mechanical injury, and injury from water:

<u>Cement Type(s)</u>	<u>Days Curing</u>
III, IIIA.....	3
I, IA, II, IIA.....	7
IS, IS-A, S, SA, N and Pozzolan Blends.....	10

Curing shall be performed using one of the methods describe below. Impervious membrane curing compounds shall not be permitted in tanks, sumps, pits, boxes, manholes, etc. which may contain raw, process, potable or wastewater unless expressly approved for such use by applicable health and environmental codes, laws, regulations, or ordinances.

1. MOIST CURING

Unformed surfaces shall be covered with burlap or mats, wetted before placing, and overlapped at least 6 inches. Burlap or mats shall be kept continually wet and in intimate contact with the surface. Where formed surfaces are cured in the forms, the forms and exposed concrete shall be kept continually wet. If the forms are removed before the end of the curing period, curing shall be continued as on unformed surfaces, using suitable materials. Burlap shall be used only on surfaces that will be unexposed in the finished work and shall be in two layers.

2. IMPERVIOUS SHEET CURING

All surfaces shall be thoroughly wetted with a fine spray of water and be completely covered with waterproof paper, polyethylene sheeting, or with polyethylene-coated burlap having the burlap thoroughly water-saturated before placing. Covering shall be laid with light colored side up. Covering shall be lapped not less than 12 inches and securely weighted down or shall be lapped not less than 4 inches and taped to form a continuous cover with completely closed joints. Sheets shall be weighted to prevent displacement or billowing from winds. Coverings shall be folded down over exposed edges of slabs and secured by approved means. Sheets shall be immediately repaired or replaced if tears or holes appear during the curing period.

3. PONDING

The entire concrete surface to be cured shall be immersed in water by building impervious dikes. Ponding water shall not be more than 20°F cooler than the concrete. Water quality shall be sufficient to prevent discoloration.

4. MEMBRANE FORMING COMPOUNDS

An approved impervious membrane curing compound may be used for curing concrete in structures and when surfaces do not require a rubbed or special finish. When membrane curing is used, exposed reinforcing steel and construction joint surfaces shall be covered or shielded to prevent coating with curing compound. Construction joint surfaces shall be wet cured by approved methods and this curing shall begin as soon as possible after concrete placement. Concrete surfaces in contact with forms shall be sealed immediately after completion of form removal and surface finishing. Membrane curing shall be applied as soon as surface moisture has evaporated. Method and application rate of curing compound shall be in accordance with the manufacturer's recommendations, but in no case shall the application rate be less than 1 gallon per 100 square feet of surface area. The compound shall be applied in 1 or 2 applications. If the compound is applied in 2 increments, the second application shall follow the first application within 30 minutes. Satisfactory equipment shall be provided, with means to properly control and direct application of curing compound on concrete surfaces to result in uniform coverage. If rain falls on newly coated concrete before the film has dried sufficiently to resist damage, or if the film is damaged, a new coat of compound shall be applied to affected portions.

805-3.11 REMOVAL OF FALSEWORK AND FORMS

Except as otherwise specified herein, forms for surfaces requiring a rubbed or special finish shall be removed not less than 1/2 nor more than 2 curing days after concrete is placed, to permit finishing.

Forms for surfaces not requiring a rubbed or special finish, and supporting forms and falsework for structure members such as bent caps, beams, and slabs, shall be removed in accordance with one of the following methods:

1. **Method 1:** Forms and falsework may be removed as soon as concrete has attained 80% of its specified 28 days compressive strength, as determined by cylinder tests.
2. **Method 2:** Forms and falsework may be removed when concrete has aged for the minimum number of curing days in the following table:

Form Type/Location	Min. Days to Removal
Under slabs, beams, or pile caps with span lengths of 10 ft. and less.	7
Under slabs, beams, or pile caps with span lengths over 10 ft. and less than 17 ft..	7 plus 1 day for each foot of span over 10 ft.
Under slabs, beams, or pile caps with span lengths over 17 ft..	14
Under portions of slabs that cantilever more than 1 ft.	7
Walls, columns, side forms for beams, and pile caps that cantilever 1 ft. or less.	1

The terms "curing day" will be interpreted as a calendar day on which the temperature is above 50°F for at least 19 hours. Colder days may be counted if satisfactory provision is made to maintain air temperature adjacent to concrete above 50°F throughout the day.

During continued cold weather, when artificial heat is not provided, the Engineer may permit removal of forms and falsework at the end of a period of calendar days equal to 2 times the number of curing days stated above. In determining the time for removal of forms and falsework and discontinuance of heating, consideration will be given to location and character of the structure, weather and other conditions influencing setting of concrete.

The foregoing provisions for form and falsework removal shall apply only to forms or parts of forms so constructed as to permit removal without disturbing forms or falsework which are required to be left in place for a longer period on other portions of the structure. Regardless of the outlined schedule no removal shall occur until sufficient strength has developed to handle anticipated loadings.

Methods of form removal likely to cause overstressing of concrete shall not be used. Forms and their supports shall not be removed without approval. Supports shall be removed in such manner as to permit concrete to uniformly and gradually take stresses due to its own weight.

805-3.12 EXPANSION AND FIXED JOINTS

Joints shall be placed as shown on the Drawings or as directed. Joints shall be constructed as follows:

1. Open Joints: Open joints shall be constructed by insertion and subsequent removal of a wood strip, metal plate, or other approved material. Insertion and removal of the template shall be accomplished without chipping or breaking corners of concrete. Reinforcement shall not extend across an open joint.
2. Filled Joints: Joints to be sealed with poured or preformed compression seals shall be formed and constructed similar to open joints. For joints with preformed filler, the filler shall be in correct position when concrete is placed.
3. Premolded Expansion Joint Filler: Premolded fillers shall be furnished when specified and installed as directed. Material for expansion joints shall be asphalt impregnated fiber board, sealed with bitumastic joint sealer, unless noted otherwise.

4. Steel Joints: Plates, angles, or other structural shapes shall be accurately fabricated to conform to the section of the concrete floor. Care shall be taken to ensure that the surface in the finished plane is true and free of warping. Positive methods shall be employed in placing joints to keep them in correct position during placing of concrete. The opening at expansion joints shall be taken to avoid impairment of the required clearance by accurately setting the joint considering temperature effects and stage of construction at the time of installation.

Temporary restraints placed in joints shall be removed as soon as possible after casting adjacent pours.

805-3.13 CONCRETE SURFACE FINISH

Immediately following the removal of forms, fins and irregular projections shall be removed from all surfaces except from those which will not be exposed to view after construction or are not to be waterproofed. Cavities produced by form ties and all other holes, honeycombed spots, broken corners or edges and other defects shall be thoroughly cleaned and, after having been kept saturated with water, shall be pointed and trued with a mortar of cement and fine aggregate mixed in the proportions used in the concrete being finished.

Unless otherwise indicated, all exposed surfaces, except wearing surface slabs, floors, and sidewalks, shall receive a "Type 2" finish (rubbed). Unexposed surfaces shall have "Type 1" finish (ordinary). Sidewalks and drives shall have a "Type 3" finish (broomed), wearing surface slabs a Type "4" finish, and floors a "Type 5" finish as defined below:

1. TYPE 1 FINISH - ORDINARY SURFACE FINISH

An ordinary surface finish shall consist of all repairs previously mentioned relative to concrete finishing. Finished surface shall be true and even, free from projections, depressions, or stone pockets. Inability of the Contractor to complete satisfactory repairs or poor form quality resulting in excessive blemishes shall require a Type 2 finish at no addition compensation.

2. TYPE 2 FINISH - RUBBED FINISH

After concrete has set sufficiently to permit it, the exposed surfaces shall be thoroughly wetted and rubbed with a carborundum or other abrasive of equal quality to bring the surface to a smooth texture and remove all form marks. The paste formed by the rubbing as above described may be spread uniformly over the surface and allowed to take a reset, after which it shall be finished by floating with a canvas, carpet-faced or cork float or rubbed down with dry burlap.

3. TYPE 3 FINISH - SIDEWALK FINISH

After placement and consolidation, the surface shall be struck off with a strike board and floated with wooden or cork float. Edges and joints shall be tooled with an edging tool. Variation of the surface shall not exceed 1/8" under a 10' straightedge. Surface texture shall be granular, matte, or lightly broomed.

4. TYPE 4 FINISH - WEARING SLAB FINISH

Slab wearing surfaces shall be monolithically finished with a wood float. The concrete shall be tamped with special tools to force the coarse aggregate away from the surface, then screeded and floated with the straight-edge to bring the surface to the required

surface level as shown on the Drawings. While the concrete is still green, but sufficiently hardened to bear a man's weight without deep imprint, it shall be wood floated to a true even plane with no coarse aggregate visible. Sufficient pressure shall be used on the wood floats to bring the moisture to the surface. An edging tool shall be used on edges and at expansion joints.

5. TYPE 5 FINISH - FLOOR FINISH

After placement, consolidation, and screeding, bull floating (or darbying) shall be performed. No finishing operation shall be performed on a slab surface while bleed water is present. Bull floating shall be completed before excess bleed water accumulates on the surface without being overworked. Concrete surfacing tolerance shall not exceed 1/8" in 10'.

Final finishing shall commence after bleed water has evaporated and the concrete supports foot pressure with only slight indentation. Spreading dry cement and/or sand on wet spots to hasten drying or any other purpose is not permitted at any time. Edging and jointing is to be followed by hand or power floating.

Floating shall be performed with wood or metal hand floats or mechanical driven float blades. Power floating shall be conducted in a manner not resulting in cement paste being removed and clinging to the blades.

Troweling shall follow the floating as described previously. Surface after troweling shall be dense, smooth and blemish free. Multiple trowelings may be required to achieve the required surface traits. Troweling shall continue until the trowel makes a ringing sound moving over the hardening concrete.

Floor surfaces shall be finished as follows:

- Areas exposed to view and those areas to receive resilient floor finish shall be given a smooth steel trowelled finish free of all marks and blemishes.
- Areas to receive ceramic or quarry tile, terrazzo, or similar finishes shall be screeded to elevation required.

All finished surfaces shall be free of gravel pockets or honeycomb.

805-4 MEASUREMENT & PAYMENT

When listed separately in the Bid Form, items will be measured and paid as a separate unit or lump sum price. Payment for unit price items will be for the actual amount or size installed. When no separate item is listed in the Bid Form, no separate measurement shall be made. The cost of Work not listed separately in the Bid Form shall be included in another item(s) to which it most nearly relates. Contractor's prices shall include all necessary costs to complete the Work in accordance with the Drawings and Specifications.

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**TECHNICAL PROVISIONS
SECTION 807
METAL BUILDING SYSTEMS**

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TECHNICAL PROVISIONS
SECTION 807
METAL BUILDING SYSTEMS

807-1 GENERAL

807-1.1 SCOPE

Under this section of the Specifications the Contractor shall furnish and install metal building systems that consist of integrated sets of mutually dependent components including structural framing, roof panels, wall panels, soffit panels, doors, windows, and accessories.

Provide a complete, integrated set of metal building system manufacturer's standard mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior. Include primary and secondary framing, metal roof panels, metal wall panels, and accessories complying with requirements indicated.

807-1.2 DESIGN

All structural steel sections and welded plate members shall be designed in accordance with the AISC, "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings". All cold formed structural members and exterior coverings shall be designed in accordance with the AISI, "Specification for the Design of Cold-formed Steel Structural Members", latest edition.

The building shall be designed in accordance with the 2021 International Building Code with a 20 PSF roof live load and a 5 PSF collateral load. Environmental loading and importance factor shall be as listed on the Drawings.

807-1.3 SHOP DRAWINGS

After receipt of the Notice of Award, the Contractor shall furnish the Engineer a PDF of shop drawings from the manufacturer detailing the equipment or products to be furnished including dimensional data and materials of construction. The Engineer shall promptly review this data and return to the Contractor as approved, approved as noted, or rejected. Upon receipt of accepted shop drawings, the manufacturer shall proceed with order entry of the products and/or fabrication of the equipment.

The building manufacturer shall furnish complete erection drawings showing anchor bolt settings, sidewall, end wall, and roof framing, transverse cross-sections, covering and flashing details, and accessory installation details to clearly indicate the proper assembly of all building parts. All submittals furnished under this section of the Specifications shall be stamped by a Louisiana licensed professional engineer. Submittals shall include design calculations and foundation reactions.

807-2 MATERIALS

807-2.1 STRUCTURAL FRAMING

Primary framing shall be shop fabricated to indicated size and section with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly. Make shop connections by welding or by using high-strength bolts. Join flanges to webs of built-up members by a continuous submerged arc-welding process. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin or girt web, so flange compressive strength is within allowable limits for any combination of loadings. Weld clips to frames for attaching secondary framing members.

Secondary framing shall be shop fabricated to indicated size and section by roll-forming or break-forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.

807-2.2 FRAMING FINISH

All primary framing shall be H.D. galvanized. All secondary framing shall be H.D. galvanized or C.R. galvanized.

807-2.3 STRUCTURAL MEMBERS

Structural framing members shall conform to the following minimum requirements:

1. W-Shapes: ASTM A 992/A 992M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A529/A 529M, Grade 50 or 55.
2. Channels, Angles, M-Shapes, and S-Shapes: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.
3. Plate and Bar: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A529/A 529M, Grade 50 or 55.
4. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
5. Structural-Steel Sheet: Hot-rolled, ASTM A 1011/A 1011M, Structural Steel (SS), Grades 30 through 55, or High-Strength Low Alloy Steel (HSLAS), Grades 45 through 70; or cold-rolled, ASTM A 1008/A 1008M, Structural Steel (SS), Grades 25 through 80, or High-Strength Low Alloy Steel (HSLAS), Grades 45 through 70.
6. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A755M. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Structural Steel (SS), Grade 50 or 80; with Class AZ50 coating designation. Surface: Smooth, flat finish.
7. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
8. Threaded Rods: ASTM A 36/A 36M, H.D. galvanized.

9. Anchor bolts: ASTM F 1554, Grade 36, straight, H.D. galvanized.

807-2.4 METAL ROOF PANELS

Metal roof panels shall be standing seam panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with a seamed joint and mechanically attaching panels to supports using concealed clips in the side laps.

1. Material: Aluminum-zinc alloy-coated steel sheet
2. Thickness: 24 ga. (min.)
3. Exterior Finish: Modified silicone-polyester two-coat system consisting of a 0.20-0.25 mil primer with a 0.7-0.8 mil color coat.
4. Joint Type: Double folded.
5. Panel Height: 2".
6. Panel Coverage: 18".
7. Length: Full length from eave to ridge, unless otherwise indicated or approved by the Engineer.
8. Uplift Rating: UL 90.

Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels, unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.
2. Clips: Manufacturer's standard, formed from steel sheet, designed to withstand negative-load requirements.
3. Cleats: Manufacturer's standard, mechanically seamed cleats formed from steel sheet.
4. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
5. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1" thick, flexible closure strips; cut or pre-molded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
6. Thermal Spacer Blocks: Where metal panels attach directly to purlins, provide thermal spacer blocks of thickness required to provide 1" standoff; fabricated from extruded polystyrene.

807-2.5 METAL WALL & LINER PANELS

Metal wall and liner panels shall be large tapered-rib profile, Exposed-Fastener Metal Wall Panels: Structural metal roof panel consisting of formed metal sheet with trapezoidal major ribs with intermediate stiffening ribs symmetrically spaced between major ribs; designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.

1. Material: Aluminum-zinc alloy-coated steel sheet
2. Thickness: 26 ga. (min.)
3. Exterior Finish: Modified silicone-polyester two-coat system consisting of a 0.20-0.25 mil primer with a 0.7-0.8 mil color coat.
4. Major Rib Spacing: 12" O.C.
5. Panel Coverage: 36".
6. Length: Full height of building, unless otherwise indicated or approved by the Engineer.
7. Fasteners: Cup-head hex drive screw with gasket.

Provide components required for a complete metal wall panel assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.

1. Closures: Provide closures at eaves and rakes, fabricated of same material as metal wall panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1" thick, flexible closure strips; cut or pre-molded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

807-2.6 METAL SOFFIT PANELS

Metal soffit panels shall be smooth or corrugated, Exposed-Fastener Metal Soffit Panels: designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.

1. Material: Aluminum-zinc alloy-coated steel sheet
2. Thickness: 26 ga. (min.)
3. Exterior Finish: Modified silicone-polyester two-coat system consisting of a 0.20-0.25 mil primer with a 0.7-0.8 mil color coat.
4. Rib Height for Corrugated Panels: 7/8" (max.).
5. Panel Coverage: 32".
6. Fasteners: Cup-head hex drive screw with gasket.

807-2.7 ACCESSORIES & TRIM

Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

Form flashing and trim from minimum 26 ga., metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match adjacent metal panels.

1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
2. Opening Trim: Minimum 26 ga., metallic-coated steel sheet or aluminum- zinc alloy-coated steel sheet prepainted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.

807-2.8 GUTTERS & DOWNSPOUTS

Gutters shall be formed from minimum 26 ga., metallic-coated steel sheet or aluminum- zinc alloy-coated steel sheet prepainted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- long sections, sized according to SMACNA's "Architectural Sheet Metal Manual." Gutter supports shall be fabricated from the same material and finish and shall be spaced a maximum of 36" O.C.

Downspouts shall be formed from 26 ga., zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match metal wall panels. Fabricate in minimum 10-foot- long sections, complete with formed elbows and offsets. Mounting straps shall be fabricated from the same material and finish and shall be spaced a maximum of 10' O.C.

807-2.9 FASTENERS

Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of materials being fastened by means of plastic caps or factory-applied coating.

1. Fasteners for Metal Wall Panels: Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, with nylon or polypropylene washer.
2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.

807-2.10 SEALANTS

Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape of manufacturer's standard size.

Joint Sealant: ASTM C 920; one-part elastomeric polyurethane, polysulfide, or silicone-rubber sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended by metal building system manufacturer.

807-2.11 INSULATION

Where called for on the Drawings, vinyl covered fiberglass insulation shall be provided on insides of walls and roof. Insulation shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 450.

For insulated buildings, purlins shall be insulated to eliminate "thermal short circuits" between purlins and roof panels through the installation of thermal blocks at each purlin location. Thermal blocks shall consist of R-5 rigid insulation extending a minimum of 1" beyond the width of the purlin on each side.

807-2.12 GROUT

All column bases shall be grouted with nonmetallic, shrinkage-resistant grout conforming to ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

807-2.13 OVERHEAD ROLLING DOORS

Design and reinforce rolling doors to withstand a wind loading pressure with a maximum deflection of 1/120 of opening width based on a design wind loading pressure of 50 psf. Barrel deflection shall not exceed 0.03" per foot of span under full load. Design torsion rod for counterbalance shaft of case-hardened steel of required size to hold the fixed spring ends and carry the torsional load. Design door assembly, including operator, to operate for not less than 20,000 cycles. Doors shall be fabricated for face-of-wall mounting as shown on the Drawings. Slot bolt holes for track adjustment. Windlocks shall be provided as required to meet the design wind load.

Interlocking door curtain slats shall be structural quality, cold-rolled galvanized steel sheets complying with ASTM A 446, Grade A, with G90 zinc coating, complying with ASTM A 653. Front and back of curtain slats shall be 24 gauge (minimum). Slats shall be coated with a weather resistant polyester enamel coating. Color shall be selected by Owner. Slats shall be insulated with rigid cellular polystyrene or foamed-in-place, CFC/HCFC free polyurethane providing a minimum R-7.7.

Bottom bar shall consist of 2 galvanized steel angles, each not less than 1-1/2" x 1-1/2" x 1/8" thick. Endlocks shall be malleable iron castings galvanized after fabrication, secured to curtain slats for curtain alignment and resistance against lateral movement. Curtain jamb guides shall be 3/16" thick (minimum) galvanized steel angles or galvanized steel channels and angles with sufficient depth and strength to retain the curtain loading. Fabricate steel hoods for doors of not less than 24 gage hot dip galvanized steel sheet with G90 zinc coating complying with ASTM A 653.

Provide spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance the weight of the curtain, with uniform adjustment accessible from outside barrel. Provide cast steel barrel plugs to secure ends of springs to the barrel and the shaft. Spring barrel shall be of hot formed structural quality carbon steel, welded or seamless pipe, of sufficient diameter and wall thickness to support the roll-up of curtain without distortion of slats.

Counterbalance doors by means of an adjustable steel helical torsion spring, mounted around a steel shaft and mounted in a spring barrel and connected to the door curtain with the barrel rings. Use grease-sealed bearings to self-lubricating graphite bearings for rotating members.

Form an entirely enclosed coiled curtain and operating mechanism at opening head and act as a weather seal. Contour to suit end brackets for which hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface mounted hoods and any portion of hood and jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to prevent sagging.

Provide a manual chain hoist operator consisting of an endless steel hand chain, chain pocket wheel and guard and a geared reduction unit with a maximum 35 pounds pull for door operation. Design chain hoist with a self-locking mechanism allowing the curtain to be stopped at any point in its travel and to remain in position until movement is reactivated. Furnish cadmium plated alloy steel hand chain with chain holder secured to operator guide. Chain-hoist doors shall have chain keepers suitable for padlocks.

Provide natural rubber or neoprene rubber weather-stripping for exterior exposed doors. Secure weather seals with continuous metal pressure bars. At door heads, use a 1/8" thick continuous sheet secured to the inside of the curtain coil hood. At door jambs, use a 1/8" thick continuous strip secured to the exterior side of the jamb guide. Provide a replaceable gasket of flexible vinyl or neoprene between angles as a weather seal and cushion bumper. Weather seal package shall meet IECC 2015 C402.4.3. The Contractor shall caulk the entire door frame perimeter to ensure complete weather tightness.

Overhead rolling doors shall be Cornell, or approved equal, as supplied by A Door-Works, Inc., 715 Patch St., Sulphur, LA, 70665, (337) 527-5000.

807-2.14 HOLLOW METAL DOORS

Hollow metal doors shall be constructed from galvanized sheet, ASTM A653/A653M with a coating thickness of A60. Doors shall be full flush complying with ANSI A250.8; face panels laminated to core and complete unit closed with steel perimeter channels projection welded to the face sheets. Thickness shall be 1-3/4", ANSI Level 2, Model 1 with 18 gage faces and visible edge seams. Frames shall be 16 gage with welded corners. Doors shall be reinforced at top and bottom, hinges, locks, and closers. Doors shall have an insulated polystyrene core with maximum U-value of 0.13.

Hinges shall be stainless steel with stainless steel pins. Ball bearing hinges shall be provided for doors with closers and for entry doors. Three hinges shall be provided for swinging doors 1-3/4" thick and larger.

Locksets shall be mortise type locksets certified ANSI/BHMAA156.13 Series 1000, Grade 3. Locks shall have an outside keyed deadbolt with inside thumbturn. When deadbolt is projected, outside lever shall automatically lock. Operation of the inside lever shall unlock the latchbolt and deadbolt simultaneously to provide anti-panic operation. Locksets shall be Yale 8822FL, or approved equal.

Door closers shall meet ANSI/BHMA A156.4, Grade 2 requirements. Provide closers adjustable from sizes 1-6. Closers shall be non-handed to meet a variety of door conditions and design requirements. Closing speed, latching speed and backcheck shall be controlled by separate key operated, captivated valves. Closers shall have heat treated rack and pinion

construction. Closer main arms shall be heavy duty steel. Door closer bodies: One piece door closer body shall be of high strength cast aluminum alloy. Door closers shall be Yale Series 5100, or approved equal.

807-3 INSTALLATION

807-3.1 EXAMINATION

Contractor shall off-load materials and equipment at installation site using equipment of sufficient size and design to prevent injury or damage. Material/equipment manufacturer shall provide written instruction for proper handling. Immediately after off-loading, Contractor shall inspect all components and appurtenances for shipping damage or missing parts. Any damage or discrepancy shall be noted in written claim with shipper prior to accepting delivery. Validate all parts lists with shipping documentation. Notify the manufacturer's representative of any unacceptable conditions noted with shipper.

Examine substrates, areas, and conditions, with Erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Before erection proceeds, survey elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with Erector present, for compliance with requirements and metal building system manufacturer's tolerances. Proceed with erection only after unsatisfactory conditions have been corrected.

807-3.2 ERECTION OF STRUCTURAL FRAMING

Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place, unless otherwise indicated.

Erect metal building system according to manufacturer's written erection instructions and erection drawings. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer. Set structural framing accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.

1. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials and roughen surfaces prior to setting plates. Clean bottom surface of plates. Set plates for structural members on wedges, shims, or setting nuts as required. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
2. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

3. Primary Framing and End Walls: Erect framing true to line, level, plumb, rigid, and secure. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist cure grout for not less than seven days after placement.
4. Secondary Framing: Erect framing true to line, level, plumb, rigid, and secure. Fasten secondary framing to primary framing using clips with field connections using non-high-strength bolts. Provide rake or gable purlins with tight-fitting closure channels and fascia. Locate and space wall girts to suit openings such as doors and windows. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.
5. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings. Tighten rod and cable bracing to avoid sag. Locate interior end-bay bracing only where indicated.
6. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.

807-3.3 INSTALLATION OF METAL PANELS

Examine primary and secondary framing to verify that structural panel support members and anchorages have been installed within alignment tolerances required by manufacturer. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before metal panel installation.

General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints.
2. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.
3. Install metal panels perpendicular to structural supports, unless otherwise indicated.
4. Flash and seal metal panels with weather closures at eaves and rakes and at perimeter of openings and similar elements. Fasten with self-tapping screws.
5. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated, or if not indicated, as necessary for waterproofing.
6. Locate and space fastenings in uniform vertical and horizontal alignment.
7. Locate metal panel splices over, but not attached to, structural supports with end laps in alignment. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
8. Lap metal flashing over metal panels to allow moisture to run over and off the material.
9. Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or metal panels. Install screws in predrilled holes.

10. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.

11. Install ridge caps as metal roof panel work proceeds.

Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal panel manufacturer. Size control joint in accordance instructions from sealant manufacturer for best sealant performance. Seal metal panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal panel manufacturer.

Shim and align metal panels within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

807-3.4 STANDING SEAM ROOF PANEL INSTALLATION

Standing seam metal roof panels shall be installed in accordance with the manufacturer's instructions.

1. Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.
2. Install clips to supports with self-tapping fasteners.
3. Install pressure plates at locations indicated in manufacturer's written installation instructions.
4. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
5. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction. Predrill panels for fasteners.
6. Provide metal closures at peaks, rake edges, rake walls and each side of ridge caps.
7. Metal Fascia Panels: Align bottom of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal metal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

807-3.5 INSTALLATION OF TRIM & ACCESSORIES

Install accessories with positive anchorage to building with weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components. Install components for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.

Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.

Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24" of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1" deep, filled with mastic sealant (concealed within joints).

807-3.6 INSTALLATION OF GUTTERS & DOWNSPOUTS

Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 4' O.C. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60" O.C. in between. Provide elbows at base of downspouts to direct water away from building.

807-3.7 CLEANING & PROTECTION

Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.

Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

Touchup Painting: After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing, bearing plates, and accessories. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

807-3.8 WARRANTY

Warranty on Metal Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period as follows:

1. Color fading in excess of 7 Hunter units per ASTM D 2244.
2. Chalking in excess of No. 8 rating per ASTM D 4214.
3. Failure of adhesion, peeling, checking, or cracking.
4. Warranty Period: 20 years from date of Substantial Completion.

Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam, metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

807-4 **MEASUREMENT & PAYMENT**

When listed separately in the Bid Form, items will be measured and paid as a separate unit or lump sum price. Payment for unit price items will be for the actual amount or size installed. When no separate item is listed in the Bid Form, no separate measurement shall be made. The cost of Work not listed separately in the Bid Form shall be included in another item(s) to which it most nearly relates. Contractor's prices shall include all necessary costs to complete the Work in accordance with the Drawings and Specifications.

**TECHNICAL PROVISIONS
SECTION 811
PAINTING & COATING SYSTEMS**

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TECHNICAL PROVISIONS
SECTION 811
PAINTING & COATING SYSTEMS

811-1 GENERAL

811-1.1 SCOPE

This section of the Specifications covers the furnishing and application of paint and/or other coatings to interior and exterior surfaces of the various structures and components of the Project for protection against corrosion, deterioration and wear; and also to present a neat and pleasing appearance to those surfaces which are visible.

The structures and/or other surfaces which are to be painted or coated and the paint or coatings to be used are shown on the Drawings and/or described herein.

811-1.2 QUALIFICATIONS

All materials specified herein shall be as manufactured by the Tnemec Company, Inc., or approved equal.

Equivalent materials of other manufacturers may be substituted on approval of the Engineer. Requests for substitution shall include manufacturer's literature for each product giving the name, generic type, descriptive information, and evidence of satisfactory past performance. Submittals shall include the following performance data as certified by a qualified testing:

1. Abrasion - Fed. Test Method Std. No. 141, Method 6192, CS-17 Wheel, 1,000 grams load.
2. Adhesion - Elcometer Adhesion Tester
3. Exterior Exposure - Exposed at 45 degrees facing ocean
4. Hardness - ASTM D3363-74
5. Humidity - ASTM D2247-68
6. Salt Spray (FOG) - ASTM B117-73.

811-1.3 SUBMITTALS

After receipt of the Notice of Award, the Contractor shall furnish the Engineer a PDF of submittals from the manufacturer detailing the products to be furnished including conformance to the qualifications listed above. The Engineer shall promptly review this data and return to the Contractor as approved, approved as noted, or rejected. Upon receipt of accepted submittals, the manufacturer shall proceed with order entry.

811-2 MATERIALS

811-2.1 COATINGS

Coatings, described by their generic types, are tabulated below for use with various project components and usages and are related to the conditions to which they will be exposed. Surface preparation nomenclature is that of standards of the Steel Structures Painting Council. The number of coats required to obtain the necessary dry film thickness is listed;

however, if the manufacturer's recommendations are greater than those tabulated, his thickness will control.

1. Ferrous Metals: Structural Steel Tanks, Piping, and Equipment (other than H.D. Galvanized)		
A. Exterior, Non-immersion Service:		
Surface Prep: SSPC-SP6 Commercial Blast Cleaning		Dry Film Mils
Primer:	Series 90G1K-97 Tneme-Zinc or Series 91 H2O Hydro-Zinc	2.5-3.5 mils
Touch-up :	Series 90G1K-97 Tneme-Zinc or Series 91 H2O Hydro-Zinc	2.5-3.5 mils
Intermediate:	Series 66 Epoxoline	4-6 mils
Finish:	Series 1094 Endura-Shield Aliphatic Acrylic Polyurethane	2.5-3.0 mils
	TOTAL MINIMUM THICKNESS	9.5-14.5 mils
B. Interior, Immersion Potable Water Service:		
Surface Prep: SSPC-SP10 Near White Metal Blast Cleaning		Dry Film Mils
Primer:	Series 91 or 94 H2O Hydro-Zinc	2.5-3.5 mils
Stripe Coat:	Series N140 Pota-Pox Plus	
Intermediate:	Series 21 Epoxoline	12-16 mils
	TOTAL MINIMUM THICKNESS	14.5-19.5 mils
C. Interior, Non-immersion Service:		
Surface Prep: SSPC-SP6 Commercial Blast Cleaning		Dry Film Mils
Primer:	Series 901K-97 Tneme-Zinc or Series 91 H2O Hydro-Zinc	2.5-3.5 mils
Stripe Coat:	Series 901K-97 Tneme-Zinc or Series 91 H2O Hydro-Zinc	2.5-3.5 mils
Intermediate:	Series 66 Epoxoline	4-6 mils
Finish:	Series 66 Epoxoline	3-5 mils
	TOTAL MINIMUM THICKNESS	9.5-14.5 mils

**Coating schedule is based on the coatings manufactured by Tnemec Company, Inc.

2. Ductile Iron Pipe and Fittings		
A. Exterior, Non-immersion Service:		
Surface Prep of <u>existing</u> pipe and fittings:	Abrasive blast with a fine abrasive to remove all existing coatings and all oxides and achieve a minimum 1.5 mil anchor profile using Holdtight 102 to prevent flash rusting. DO NOT OVERBLAST OR DAMAGE DUCTILE IRON. Follow guidelines established in the latest edition of NAPF 500.	Dry Film Mils
Primer:	Tnemec Series 66 Epoxy Polyamide Primer (Brush apply to all nuts and bolts)	4.0-6.0 mils
Surface Prep of <u>new</u> pipe and fittings:	New ductile iron pipe and fittings that have been primed at the factory as described above shall be cleaned to remove all soluble contaminants prior to field application of the Intermediate and Finish coats per below.	
Intermediate:	Tnemec Series 66 Epoxy Polyamide Primer	4.0-6.0 mils
Finish:	Series 1094 Endura-Shield Aliphatic Acrylic Polyurethane	2.5-3.5 mils
	TOTAL MINIMUM THICKNESS	10.5-15.5 mils
B. Interior, Non-immersion Service:		
Surface Prep of <u>existing</u> pipe and fittings:	Abrasive blast with a fine abrasive to remove all existing coatings and all oxides and achieve a minimum 1.5 mil anchor profile using Holdtight 102 to prevent flash rusting. DO NOT OVERBLAST OR DAMAGE DUCTILE IRON. Follow guidelines established in the latest edition of NAPF 500.	Dry Film Mils
Primer:	Tnemec Series 66 Epoxy Polyamide Primer (Brush apply to all nuts and bolts)	4.0-6.0 mils
Surface Prep of <u>new</u> pipe and fittings:	New ductile iron pipe and fittings that have been primed at the factory as described above shall be cleaned to remove all soluble contaminants prior to field application of the Intermediate and Finish coats per below.	
Intermediate:	Tnemec Series 66 Epoxy Polyamide Primer	4.0-6.0 mils
Finish:	Tnemec Series 66 Epoxoline	3.0-5.0 mils
	TOTAL MINIMUM THICKNESS	11.0-17.0 mils

2. Ductile Iron Pipe and Fittings (cont.)		
C. Inside Wet Wells, Manholes, or Wastewater Valve Vaults:		
Surface Prep of <u>existing</u> pipe and fittings:	Abrasive blast with a fine abrasive to remove any existing coatings and all oxides and achieve a minimum 1.5 mil anchor profile using Holdtight 102 to prevent flash rusting. DO NOT OVERBLAST OR DAMAGE DUCTILE IRON. Follow guidelines established in the latest edition of NAPF 500.	Dry Film Mils
Primer:	Tnemec Series 66 Epoxy Polyamide Primer (Brush apply to all nuts and bolts)	4.0-6.0 mils
Surface Prep of <u>new</u> pipe and fittings:	New ductile iron pipe and fittings that have been primed at the factory as described above shall be brush blasted immediately prior to field application of the Intermediate and Finish coats per below.	
Intermediate:	Tnemec Series 104 Amine Epoxy	6.0-8.0 mils
Finish:	Tnemec Series 104 Amine Epoxy	6.0-8.0 mils
	TOTAL MINIMUM THICKNESS	16.0-22.0 mils

3. Building Components		
A. Exterior (galvanized) Hollow Metal Frame Doors		
Surface Prep:	Clean and dry. Spot SSPC SP2/SP3. Treat with Great Lakes Clean Etch, Henkel Galvaprep, or approved equal.	
Spot Prime:	Tnemec Series 115 Uni-Bond DF	2.0-3.0 mils
Finish:	Tnemec Series 1028 Enduratone	2.0-3.0 mils
	TOTAL MINIMUM THICKNESS	2.0-3.0 mils

**Coating schedule is based on the coatings manufactured by Tnemec Company, Inc.

811-2.2 NSF COMPLIANCE

In accordance with *Louisiana Sanitary Code* (LAC 51:XII) Chapter 2, Subchapter C, Section 225.S.1, protective coatings for interior wet applications shall be certified in accordance with NSF/ANSI Standard 61. Paints or other materials used in the interior coating shall be nontoxic to humans and shall be of such composition that the palatability of the water stored or processed shall not be adversely affected. The "Standard for Coating Steel Water Storage Tanks" (AWWA D102) shall be complied with. Materials shall meet the extraction requirements of NSF/ANSI Standard 600.

811-2.3 COLORS

If not shown in the Contract Documents or when OSHA or other regulatory agencies color coding systems are not applicable, the colors to be used shall conform with the Owner's standard or will be selected by him from the approved manufacturer's color list submitted by the Contractor.

811-2.4 ABRASIVE MATERIAL

The abrasive used in the abrasive cleaning shall be a material acceptable to the regulatory agencies of the state of Louisiana for use in the described work. The material shall be of a shape and size to produce a uniform surface of acceptable profile to properly bond the prime coat. The abrasive shall be free of moisture, water soluble contaminants, dust, and oil. The abrasive shall be stored and covered to prevent moisture contamination. Abrasive shall be low dusting and shall not contain respirable free silica.

811-3 **INSTALLATION**

811-3.1 STORAGE & SAFETY

All paints and coatings shall be stored in facilities designed for the purpose of paint storage and mixing. Storage areas shall be located away from open flames, be well ventilated, and be capable of maintaining ambient storage temperature of not less than 45°F. and no more than 80°F.

Paint, coatings, reducing agents, and other solvents must be stored in original containers until opened; if not resealable, then must be transferred to UL approved safety containers. Provide proper ventilation, personal protection and fire protection for storage and use of same.

In accordance with requirements set forth by regulatory agencies applicable to the construction industry, the manufacturer's printed instructions and appropriate technical bulletins and manuals, the Contractor shall provide and require use of protective lifesaving equipment for persons working in, or about the project site.

Equipment shall include protective helmets which shall be worn by all persons while in the vicinity of the work. In addition, workers engaged in or near the work during sandblasting shall wear eye and face protection devices and air purifying, half-mask, or mouthpiece respirator with appropriate filter. Barrier creams shall be used on any exposed areas of skin.

Where ventilation is used to control hazardous exposure, all equipment shall be explosion proof. Ventilation shall reduce the concentration of air contaminant to the degree a hazard does not exist. Air circulation and exhausting of solvent vapors shall be continued until coatings have fully cured.

Whenever the occupational noise exposure exceeds State and Federal maximum allowable sound levels, the Contractor shall provide and require the use of approved ear protective devices.

Adequate illumination shall be provided while work is in progress, including explosion proof lights and electrical equipment. Whenever required by the Engineer, the Contractor shall

provide additional illumination and necessary supports to cover all areas to be inspected. The level of illumination for inspection purposes shall be determined by the Engineer.

All temporary ladders and scaffolding shall conform to applicable safety requirements. They shall be erected where requested by the Engineer to facilitate inspection and be moved by the Contractor to locations requested by the Engineer.

811-3.2 EXAMINATION & PROTECTION

Thoroughly examine surface scheduled to be painted prior to commencing work. Report in writing to the Owner's representative any condition that may affect proper application and overall performance of coating system. Do not proceed with work until such conditions have been corrected. Commencing with work indicates acceptance of existing conditions and responsibility for performance of applied coating.

Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to the formation of a durable paint film.

Protection: Diligence should be taken to ensure that vehicles, equipment, fixtures, miscellaneous hardware, etc. are protected against spillage, overspray, etc. Surfaces not to be coated will be marked, removed, or otherwise covered to protect against cleaning and coating application procedures and weather. Such damages shall be corrected at no expense to the Owner.

811-3.3 APPLICATION

Substrate surface shall be prepared and the paint or coating mixed and applied in strict conformance with the manufacturer's requirements and recommendations.

The Contractor shall repair all damage to prime or shop coatings before proceeding with application of field coats. It is his entire responsibility to determine the compatibility of the prime or shop coating with the field coating before it is applied, regardless of prior approval having been given by the Owner or his agent.

Surface preparation of steel will be based upon comparison with SSPC-Vis 1, "Pictorial Surface Preparation Standards for Painting Steel Surfaces"; SSPC-Vis 2, "Standards Methods of Evaluation Degree of Rusting on Painting Steel Surfaces"; and "Visual Standard for Surfaces of New Steel Airblast Cleaned with Sand Abrasive".

Materials shall be mixed, thinned, and applied according to the manufacturer's printed instructions and in accordance with the AWWA D102.

No paint shall be applied when it is expected that the relative humidity will exceed 85%, when the surface temperature is less than 5°F above the dew point or when the air temperature will drop below 45°F. within 4 hours after the application of the paint.

Maintain proper ventilation in area of work to alleviate volatile solvents evaporating from coating materials.

All ingredients in any container of the coating materials shall be thoroughly mixed and shall be agitated often during application to keep the pigment suspended.

Should thinning be required, use only the amounts specified by the coating manufacturer.

Application of coating shall be by brush, roller, mitt, or spray and in accordance with manufacturer's recommendations. All material shall be evenly applied to form a smooth, continuous, unbroken coating. Drips, runs, sags, or pinholes shall not be acceptable.

Do not apply succeeding coats until the previous coat has completely dried and within the time limit complying with the manufacturer's directions.

No paint shall be applied when surrounding air temperature, as measured in the shade, is below 45°F. except where approved by the coating manufacturer. No paint shall be applied when the temperature of the surface to be painted is below 50°F. Paint shall not be applied to wet or damp surface, and shall not be applied in rain, snow, fog or mist. Paint shall not be applied when the substrate temperature is less than 5° above the dewpoint. Paint manufacturer's temperature guidelines must be followed.

811-3.4 SURFACE PREPARATION

All surface preparation, coating and painting shall conform to applicable standard of the Society of Protective Coatings (SSPC), and the coating manufacturer's printed instructions. Material applied prior to approval of the surface by the Engineer shall be removed and re-applied to the satisfaction of the Engineer at the expense of the contractor.

All work shall be performed by skilled craftsmen qualified to perform the required work in a manner comparable with the best standards of practice. Continuity of personnel shall be maintained and transfers of key personnel shall be coordinated with the Engineer.

Dust, dirt, oil, grease, or any foreign matter that will affect the adhesion or durability of the finish must be removed by washing with clean rags dipped in an approved cleaning solvent and wiped dry with clean rags as per SSPC SP1.

Coating and painting systems include surface preparations, prime coating, and finish coatings. Any offsite work which does not conform to this specification is subject to rejection by the Engineer.

The Contractor's coating and painting equipment shall be designed for application of materials specified and shall be maintained in first class working condition. Compressors shall have suitable traps and filters to remove water and oils from the air. Contractor's equipment shall be subject to approval of the Engineer.

The first coat shall be applied to all steel substrate within twelve (12) hours after surface preparation and cleaning or before any rust bloom forms. Any cleaned steel not receiving the first coat within twelve (12) hours or showing rust bloom shall be recleaned prior to application of the first coat.

Prior to assembly, all surfaces made inaccessible after assembly shall be prepared as specified herein and shall receive the coating or paint system specification.

1. SSPC-SP1 Solvent Cleaning:

Removal of oil, grease, soil, and other contaminants by use of solvents, emulsions, cleaning compounds, steam cleaning or similar materials and methods which involve a solvent or cleaning action.

2. SSPC-SP2 Hand Tool Cleaning:

Removal of loose rust, loose mill scales and other detrimental foreign matter to degree specified by hand chipping, scraping, sanding, and wire-brushing.

3. SSPC-SP3 Power Tool Cleaning:

Removal of loose rust, loose mill scale, and other detrimental foreign matter to degree specified by power wire-brushing, power impact tools or power sanders.

4. SSPC-SP5 White Metal Blast Cleaning:

Blast cleaning to a gray-white uniform metallic color until each element of surface area is free of all visible residues.

5. SSPC-SP6 Commercial Blast Cleaning:

Blast cleaning until at least two-thirds of each element of surface area is free of all visible residues.

6. SSPC-SP7 Brush-Off Blast Cleaning:

Blast cleaning to remove loose rust, loose mill scale, and other detrimental foreign matter to degree specified.

7. SSPC-SP10 Near White Blast Cleaning:

Blast cleaning to nearly white metal cleanliness, until at least 95 percent of each element of surface area is free of all visible residues.

Slag and weld metal accumulation and spatters not removed by the fabricator, erector or installer shall be removed by chipping and grinding. All sharp edges shall be peened, ground, or otherwise blunted as required by the Engineer.

Field blast cleaning for all surfaces shall be by dry method unless otherwise directed.

During blast cleaning operations, caution shall be exercised to ensure that existing coatings or paint are not exposed to abrasion from blast cleaning.

Blasting operations shall be contained in accordance with federal, state and local requirements and to prevent debris from leaving project site. The Contractor shall keep the area of his work in a clean condition and shall not permit blasting materials to accumulate as to constitute a nuisance or hazard to the prosecution of the work or the operation of the existing facilities.

811-3.5 INSPECTION & TESTING

All surface preparation and repairs shall be approved by the Engineer/Owner before primer is applied.

After application of each coating in the specified system and its surface has cured, measure its thickness with a properly calibrated Nordson Microtest Dry Film Thickness Gauge, or equivalent. (Use an instrument such as a Tooke gauge if a destructive tester is deemed necessary.) Follow standard method for measurement or dry paint thickness with magnetic gauges as outlined in Steel Structures Painting Council's SSPC-PA2-73T. The Engineer shall, at his discretion, use the Contractor's or his own equipment to perform similar inspections.

Make as many determinations as needed to ensure the specified thickness values in each typical area. To all surfaces having less dry film thickness than specified, apply additional coat(s) at no extra cost to Owner to bring thickness up to specifications.

The Owner reserves the right to have any or all of the dry film thicknesses in place tested by a laboratory of his choice. If they meet the requirements, the costs of testing will be borne by him. If they do not, the Contractor shall pay the costs of this testing, shall take the proper remedial action, and shall have the new film thickness measured by the same laboratory, all at his own expense.

For immersed, interior surfaces, a non-destructive holiday detector (not to exceed 67.5 volts or that suggested by the coating manufacturer) shall be used. All identified pinholes shall be repaired in accordance with the manufacturer's printed recommendations and then retested.

Painting contractor shall permit Owner's representative and/or paint and coating manufacturer (as requested by Owner) to inspect his work for conformance to this specification. Owner reserves the right to reject all work which does not comply with this specification.

Warranty inspection shall be conducted during the eleventh month following completion of all coating and painting work. All defective work shall be repaired in accordance with this specification and to the satisfaction of the Engineer/Owner.

811-3.6 CLEAN-UP

Upon completion, painting contractor shall clean up and remove from site all surplus materials, tools, appliances, empty cans, cartons, and rubbish resulting from painting work. Site shall be left in neat, orderly condition.

Upon completion of the work, all staging, scaffolding, and containers shall be removed from the site or destroyed in a manner approved by the Engineer. Coating or paint spots and oil or stains upon adjacent surfaces shall be removed and the jobsite cleaned. All damage to surfaces resulting from the work of painting contractor or subcontractor shall be cleaned, repaired, or refinished to the satisfaction of the Engineer at no cost to the Owner.

Remove all protective drop cloths and masking from surfaces not being painted. Provide touch-up around same areas as directed by Owner's representative.

Remove all misplaced paint splatters or dripping resulting from this work.

811-4 MEASUREMENT & PAYMENT

Unless listed separately in the Bid Form, separate payment will not be made for painting or coating as described in this section of the Specifications, the costs being included in the particular unit or lump sum prices in the Bid Form to which they most nearly relate. Costs to be included are for surface preparation; furnishing and applying the coating materials protection; storage and mixing; labor, tools and equipment, and all incidentals, complete.

TECHNICAL PROVISIONS
SECTION 819
FACTORY COATED BOLTED STEEL GROUND STORAGE TANKS

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TECHNICAL PROVISIONS
SECTION 819
FACTORY COATED BOLTED STEEL GROUND STORAGE TANKS

819-1 GENERAL

819-1.1 SCOPE

Under this section of the Specifications, the Contractor shall furnish and install a new factory coated bolted AWWA D103-latest steel tank at the location shown, complete with foundation, accessories and disinfecting as specified herein below. Capacities and dimensions are as indicated on the Drawings.

819-1.2 MANUFACTURER QUALIFICATIONS

The tank manufacturer shall be a specialist in the design, fabrication, and erection of factory-coated bolted steel tanks. The manufacturer shall be quality certified, having an active ISO-9001 Registration. Tank shall be manufactured in the USA.

The company constructing the tank shall be a firm with at least 20 years' experience in the construction of glass lined bolted steel tanks; and shall give satisfactory evidence that it has the skill, reliability and financial ability to build and guarantee the tank in accordance with the quality required by these specifications. The company constructing the tank shall have built completely in its own name in the past 10 years and be presently responsible for a minimum of ten (10) steel tanks of equal size or larger, which meet these specifications and which are now giving satisfactory service

The manufacturer shall employ a staff of full time design engineers, shall own and operate its steel fabrication facilities and glass coating facilities and fully design the tank and foundation.

The erection of the tank shall be performed by the tank manufacturer. The tank erection crew must be licensed by The Louisiana State Board of Contractors for the Erection / Installation of Bolted Steel Ground Level Storage Tanks. The tank erection crew must have experience in the erection of bolted steel tanks and have in the last two years erected at least five tanks of similar size and use.

819-1.3 SHOP DRAWINGS

After receipt of the Notice of Award, the Contractor shall furnish the Engineer a PDF of shop drawings from the manufacturer detailing the equipment or products to be furnished including dimensional data and materials of construction. The Engineer shall promptly review this data and return to the Contractor as approved, approved as noted, or rejected. Upon receipt of accepted shop drawings, the manufacturer shall proceed with order entry of the products and/or fabrication of the equipment.

All such submissions shall be sealed by a Licensed Professional Engineer licensed in the State of Louisiana. The shop drawings shall include a sealed certification listing the loading for which the tank has been designed and certifying that the design is in accordance with these specifications and AWWA D103-latest.

819-2 MATERIALS

819-2.1 TANK DESIGN

The tank capacity and nominal dimensions shall be as shown on the Drawings. Component parts of the tank such as bottom sections, wall sections and roof sections shall conform to the minimum dimensional standards of AWWA D103-latest. The bolted ground storage tank and accessories shall be designed in accordance with AWWA D103-latest as supplemented herein.

- Roof loading from snow may be omitted.
- Risk Category – IV
- Exposure Category – C
- Earthquake loading shall be based upon Seismic Use Group III.
- Perform anchor check and sliding check. Design and install anchors if required by either analysis.

819-2.2 STEEL PLATES & SHEETS

Plates and sheets used in the construction of the tank shell, tank floor, and tank roof, shall comply with the minimum standards of AWWA D103, latest edition.

Design requirements for mild strength steel shall be ASTM A570 or ASTM A1011 grade 33. Design requirements for high strength steel shall be ASTM A607 Grade 50. Minimum thickness of sheets shall be 12 ga. (0.1046"). Design requirements for steel plate and rolled shapes shall be ASTM A36.

For glass coated tanks, the annealing effect created from the glass coated firing process shall be considered in determining ultimate steel strength. In no event shall a yield strength greater than 50,000 psi be utilized for calculations detailed in AWWA D103, Sections 3.4 and 3.5. When multiple vertical bolt line sheets and plates of ASTM A607 Grade 50 are used, the effective net section area shall not be taken as greater than 85% of the gross area.

819-2.3 BOLTS

Bolts used in tank joints shall be minimum 1/2" diameter or as indicated on the Drawings. They shall meet the minimum requirements of AWWA D103-latest. Bolts shall be hot dip galvanized to ASTM A153. Bolt heads and/or nuts that are exposed to the interior liquid shall be plastic encapsulated.

819-2.4 SEALANTS

The lap joint sealant shall be a one component, moisture cured, polyurethane compound or an EPDM nylon reinforced gasket. The sealant shall be suitable for contact with potable water and shall be certified to meet NSF Standard 61 for indirect additives. The sealant shall be used to seal lap joints and bolt connections and edge fillets for sheet notches and starter sheets. The compound shall cure to a rubber-like consistency, have excellent adhesion to the tank coating, low shrinkage, and shall be suitable for both interior and exterior use. Compound curing rate shall be 6-8 hours to tack-free and 10-12 days for final cure at 73°F and 50% RH.

819-2.5 HORIZONTAL WIND STIFFENERS

Design requirements for intermediate horizontal wind stiffeners shall be of the "web truss" design with extended tail to create multiple layers of stiffener, permitting wind loads to distribute around tank. Web truss stiffeners shall be of steel with hot dipped galvanized coating.

819-2.6 FACTORY GLASS COATING

In accordance with *Louisiana Sanitary Code* (LAC 51:XII) paints or other materials used in the coating of the interior of tanks must be applied, cured, and used in a manner that satisfies NSF/ANSI Standard 61. The "Standard for Coating Steel Water Storage Tanks" (AWWA D120) shall be complied with.

Surface Preparation

Following the shearing process, sheets shall be steel grit blasted on both sides to the equivalent of SSPC-10 (Near – White Blast Cleaning). The surface anchor pattern shall be not less than 1.0 mil (0.001 inch). These sheets shall be evenly oiled on both sides to protect them from corrosion during fabrication.

Preparation of Sheet Edges

After initial sheet preparation, all full height vertical wall sheets and all rectangular shaped floor sheets shall be machined to create a beveled edge. A metal coating of 316 stainless steel shall then be thermally bonded on these edges at a thickness of 1.5 to 5 mils (0.015 to 0.005 inches). The coating shall have a tensile strength of >1500 psi (per ASTM C633-79).

Cleaning

After fabrication and prior to application of the coating system, all sheets shall be thoroughly cleaned by a caustic wash and hot rinse process followed immediately by hot air drying. Inspection of the sheets shall be made for traces of foreign matter, soil particles, grease, or rust. Any such sheets shall be re-cleaned or grit blasted to an acceptable level of quality.

Coating

A base coat of catalytic nickel oxide shall be electrostatically applied to both sides of the sheet. A second coat to both sides of the sheets, of milled cobalt blue glass, shall be applied. A third coat of glass shall be applied all interior wetted surfaces which must be titanium dioxide reinforced mixture.

The sheets shall then be fired at a minimum temperature of 1500°F in strict accordance with the manufacturer's ISO 9001 quality process control procedures, including firing time, furnace humidity, temperature control, etc. The interior coating process must be a 3 coat and 1 fire process. The interior color shall be white. The exterior color shall be cobalt blue.

The dry film interior coating thickness shall be 10.0 – 18.0 mils minimum. The dry film exterior coating thickness shall be 7.0 – 15.0 mils minimum.

The same glass coating as applied to the exterior sheet surfaces shall be applied to the exposed edges.

Factory Inspection

The manufacture's quality system shall be ISO 9001 certified. The following factory inspection schedule shall be followed.

- Chemical Resistance of Glass Coating - Every batch of component frits shall be individually tested in accordance with PEI Test T-21 (Citric Acid at Room Temperature)
- Holiday Testing - A dry volt test using a minimum of 1100 volts is required. Frequency of the test shall be every sheet. Any sheet registering a discontinuity shall be rejected. All inside sheet surfaces shall be holiday free.
- Measurement of Glass Thickness - Glass thickness shall be measured using an electronic dry film thickness gauge (magnetic induction type). The thickness gauge shall have a valid calibration record. Frequency of the test shall be every tenth sheet. The thickness of the glass shall be between 10 and 18 mils.
- Measurement of Color - The exterior color of the sheets shall be measured using a colorimeter. The colorimeter shall have a valid calibration record. Frequency of the test shall be every tenth sheet.
- Impact Adherence Test - The adherence of the glass coating to the steel shall be tested in accordance with ASTM B916-01. Any sheet that has poor adherence shall be rejected. Frequency of this test shall be one sheet per gauge lot run minimum.
- Fishscale Test - The glass coating shall be tested for fishscale by placing the sheet in an oven at 400°F for one hour. The sheet will then be examined for signs of fishscale. Any sheet exhibiting fishscale shall be rejected and all sheets from that gauge lot will be similarly tested. Frequency of this test shall be one sheet per gauge lot run minimum.

819-2.7 ALUMINUM DOME ROOF

Aluminum dome roofs shall consist of the following components and materials. Supplier shall be the same as the tank manufacturer. Dome roofs shall be constructed of non-corrugated triangular aluminum panels which are sealed and firmly clamped in an interlocking manner to a fully triangulated aluminum space truss system of wide flange extrusions, thus forming a dome structure. The dome shall be clear span and designed to be self-supporting from the periphery structure with primary horizontal thrust contained by an integral tension ring. The dome dead weight shall not exceed 3 pounds per square foot of surface area. The dome and tank shall be designed to act as an integral unit. The tank shall be designed to support an aluminum dome roof including all specified live loads.

Triangulated dome frame struts and perimeter tension/compression ring shall be of AA6005A-T6 aluminum. Structural frame node plates shall be 0.375" nominal thickness of AA6061-T6 aluminum. Triangular dome panels shall be 0.050" nominal thickness of AA3003-H16 aluminum sheet. Fasteners shall be AA2024-T4 aluminum or austenitic series 300 stainless steel as required by the manufacturers design. Sealant shall be silicone, conforming to Federal Specification TT-S-00230. Gaskets shall be silicone, conforming to Federal Specification ZZ-R-765, Class 2, Grade 50 or equal or Neoprene conforming to ASTM C509-00. Dormers, doors, vents, and hatches shall be of AA6061-T6, AA6005A-T6, AA5086-H34 or AA5052-H36 aluminum, 0.090" nominal thickness.

819-2.8 NOZZLES

Tank nozzles shall be provided as shown on the Drawings. Nozzles shall include vortex breakers and flanges as shown on the Drawings. Size and projection shall be as shown on the Drawings. Pipe shall be Sch 40. Plate shall be ¼" minimum, and flanges shall conform to ASA/ANSI B16.5 150 lb. Nozzles shall be constructed of type 304 stainless steel or carbon steel hot dip galvanized after fabrication. Pipe, flange, and plate materials shall be consistent.

Where pipe connections are shown to pass through tank panels, they shall be field located, saw cut, (acetylene torch cutting or welding is not permitted), and utilize an interior and exterior flange assembly and the tank shell reinforcing shall comply with AWWA D103 latest edition.

819-2.9 OVERFLOW

The tank overflow piping shall be Sch 10 type 304 stainless steel inside the tank and penetrating the tank wall. Outside of the tank, the overflow piping shall be Sch 80 PVC. The overflow shall terminate as shown on the Drawings with flanges and a 24 mesh stainless steel screen installed between the flanges. Provide support brackets to support the overflow piping from the tank sidewall.

819-2.10 VENT

A properly sized vent(s) in accordance with AWWA D103 shall be furnished and installed above the maximum water level of sufficient capacity so that at maximum design rate of water fill or withdrawal of 1,500 gpm excessive tank pressurization or vacuum does not occur. Minimum vent size shall be 20" diameter. The overflow pipe shall not be considered to be a tank vent.

The vent shall be constructed of aluminum such that the hood can be unbolted and used as a secondary roof access. The vent shall be so designed in construction as to prevent the entrance of birds and/or animals by including an expanded aluminum screen (½ inch) opening. A 24 mesh aluminum insect screen shall be provided inside the aluminum bird screen.

819-2.11 ACCESS

Sidewall manway(s) and roof hatch(es) shall be provided as shown on the Drawings.

The sidewall manhole and the tank shell reinforcing shall comply with AWWA D103 latest edition, Sec. 5.1. Cover shall be watertight and shall overlap a minimum of 2". Manway covers over 50 lbs. shall be hinged.

The roof opening shall be placed near the outside tank ladder and shall be provided with a hinged cover and a hasp for locking. The opening shall have a curb at least four (4") inches in height, and the cover shall have a downward overlap of at least two (2") inches.

819-2.12 LADDERS

Interior and/or exterior ladder(s) shall be provided as shown on the Drawings. Ladders shall be designed in accordance with AWWA D103 and OSHA regulations. Rungs shall be slip resistant.

Exterior ladder shall be constructed of aluminum or galvanized steel. Provide intermediate landings and standard railings in the vicinity of the roof hatch in accordance with OSHA

standards. Provide a self-closing gate at the access point to the roof. Interior ladder shall be constructed of aluminum, galvanized steel, or fiberglass. Interior and exterior ladders shall be provided with a stainless steel cable type fall prevention system.

819-2.13 **SAMPLE TAP**

Provide one 1/2" NPT plain stainless steel smooth nozzle sample tap on 1" NPT shell nozzle with stainless steel ball valve and pipe nipples for LDH sampling purposes. Sampling tap shall be positioned such that there is a minimum 12" clear space beneath the nozzle to accommodate sampling containers.

819-2.14 **IDENTIFICATION PLATE**

A manufacturer's nameplate shall list the tank serial number, tank diameter and height, and maximum design capacity. The nameplate shall be affixed to the tank exterior sidewall at a location approximately 5 ft. from grade elevation in a position of unobstructed view.

819-2.15 **CATHODIC PROTECTION**

A passive cathodic protection system shall be designed and supplied by the tank manufacturer. Attachment of anodes and wiring to tank structure shall be approved by tank manufacturer. Electrical continuity between sidewall panels shall be the responsibility of the tank manufacturer.

819-2.16 **ANCHOR BOLTS**

As part of the tank design, the tank manufacturer shall specify the required number of anchor bolts, size of anchor bolts, and required embed length for anchor bolts. Anchor bolts shall be post-installed, hot-dipped galvanized bolts conforming to ASTM F1554.

819-2.17 **GROUNDING**

The Contractor shall ground the tank in a minimum of three locations. Grounding shall be accomplished using UL listed ground lugs, 3/4"x10' copper clad ground rods, and #2 bare copper wire.

819-3 **INSTALLATION**

819-3.1 **TRANSPORTATION**

For transporting, tank material shall be placed in racks or on pallets that will prevent scratching or other damage to the coating during transport and unloading. All materials shall be marked and tagged with part number, order number, etc. to aid in field assembly.

819-3.2 **EXAMINATION**

Contractor shall off-load materials at installation site using equipment of sufficient size and design to prevent injury or damage. Tank manufacturer shall provide written instruction for proper handling. Immediately after off-loading, Contractor shall inspect all components and appurtenances for shipping damage or missing parts. Any damage or discrepancy shall be noted in written claim with shipper prior to accepting delivery. Notify the manufacturer's representative of any unacceptable conditions noted with shipper.

819-3.3 FOUNDATION

The tank shall be erected on a reinforced concrete ringwall foundation as shown on the Drawings. The levelness of the foundation shall not vary by more than $\frac{1}{4}$ " from an established plane with a differential not exceeding $\frac{1}{8}$ " in any 30' circumference. The Contractor shall furnish and install a non-extruding and resilient bituminous type filler material meeting the requirements of ASTM D1751 between the tank floor and the foundation.

819-3.4 ERECTION

Field erection of the factory-coated, bolted-steel tank shall be in strict accordance with the procedures outlined in the manufacturer's erection manual, and performed by an authorized dealer of the tank manufacturer, regularly engaged in erection of these tanks, using factory trained erectors. Specialized erection jacks and building equipment developed and manufactured by the tank manufacturer shall be used to erect the tanks.

Particular care shall be taken in handling and bolting of the tank panels and members to avoid abrasion of the coating system. Prior to a liquid test, all surface areas shall be visually inspected by the Engineer. The placement of sealant on each panel may be inspected prior to placement of adjacent panels. However, the Engineer's inspection shall not relieve the bidder from his responsibility for liquid tightness.

819-3.5 COATING REPAIR

Interior and exterior factory applied coatings shall be cleaned and inspected after erection of the tank. Any damage to the coating shall be repaired in accordance with the manufacturer's recommendations.

819-3.6 LEAK TESTING

Upon completion of the erection, the tank shall be tested for leakage. Floor shall be clean and free from dirt, foreign substances, and debris. Tank bottom seams shall be vacuum tested prior to filling the tank with water.

The tank shell shall be tested by filling the tank with potable water and any leaks or other defects which may appear will be repaired so as to leave the tank in absolutely first-class condition. The leak test can be performed along with the disinfecting of the tank; however, if the need arises that the tank has to be entered into to correct a leak, then the disinfecting must be redone.

819-3.7 DISINFECTION

Disinfecting of the tank shall be with potable water in accordance with AWWA C652 Method 2, (latest revision), and as follows. The tank shall first be scrubbed clean before disinfecting. A solution of 200-mg/L available chlorine shall be applied directly to the surfaces of all parts of the storage facility that would be in contact with water when the storage facility is full to the overflow elevation. The chlorine solution may be applied with suitable brushes or spray equipment. The solution shall thoroughly coat all surfaces to be treated, including the inlet and outlet piping, and shall be applied to any separate drain piping such that it will have available chlorine of not less than 10 mg/L when filled with water.

The disinfected surfaces shall remain in contact with the strong chlorine solution for at least 30 minutes, after which potable water shall be admitted, the drain piping purged of the 10

mg/L chlorinated water, and the storage facility then filled to its overflow level. Following this procedure, and subject to satisfactory bacteriological testing and acceptable aesthetic quality, such water may be delivered to the distribution system.

Disposal of heavily chlorinated water from the tank disinfection process shall be in accordance with Paragraph 4.3.5.1 of AWWA Standard C652, the requirements of the LDEQ, or other state or federal authorities, whichever is stricter.

819-3.8 **HEALTH TESTING**

Water from the ground storage tank shall not be furnished for consumer's use until water samples analyzed by a LDH-OPH Approved Chemical Laboratory show conformance with LAC 51:XII.225.T. Engineer shall be furnished a copy of the laboratory reports. The expense of disinfecting and lab analyses shall be borne by the Contractor.

819-3.9 **WARRANTY**

The Contractor must guarantee for one year the structure furnished under these specifications to the extent that he will repair any defects due to faulty design, workmanship or material which may appear in the structure, at no cost to the Owner.

819-4 **MEASUREMENT & PAYMENT**

When listed separately in the Bid Form, items will be measured and paid as a separate unit or lump sum price. Payment for unit price items will be for the actual amount or size installed. When no separate item is listed in the Bid Form, no separate measurement shall be made. The cost of Work not listed separately in the Bid Form shall be included in another item(s) to which it most nearly relates. Contractor's prices shall include all necessary costs to complete the Work in accordance with the Plans and Specifications.

TECHNICAL PROVISIONS
SECTION 820
PRESTRESSED CONCRETE GROUND STORAGE TANKS

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TECHNICAL PROVISIONS
SECTION 820
PRESTRESSED CONCRETE GROUND STORAGE TANKS

820-1 GENERAL

820-1.1 SCOPE

Under this section of the Specifications, the Contractor shall furnish and install a new ANSI/AWWA D110 wire-wound prestressed concrete storage tank with a Type II core wall and galvanized steel diaphragm including reinforced concrete dome, membrane floor, and all reinforcing, concrete work, accessories, disinfection, and testing at the location shown and as specified herein below. Capacities and dimensions are as indicated on the Drawings.

820-1.2 REFERENCES

- ACI 117 Specification for Tolerances for Concrete Construction and Materials
- ACI 301/301M – Specifications for Structural Concrete for Buildings.
- ACI 305R – Guide to Hot Weather Concreting.
- ACI 306R – Guide to Cold Weather Concreting.
- ACI 347R – Guide to Formwork for Concrete.
- ACI 350/350R – Code Requirements for Environmental Engineering Concrete Structures and Commentary.
- ACI 350.3 – Seismic Design of Liquid-Containing Concrete Structures and Commentary.
- ACI 372R – Design and Construction of Circular Wire- and Strand-Wrapped Prestressed Concrete Structures.
- ACI 506R – Guide to Shotcrete.
- ACI 506.2 – Specification for Materials, Proportioning, and Application of Shotcrete.
- ACI SP4: Formwork for Concrete.
- ANSI/AWWA C652 – Disinfection of Water Storage Facilities.
- ANSI/AWWA D110 – Wire- and Strand-Wound, Circular, Prestressed Concrete Water Tanks.
- ASCE Standard 7 – Minimum Design Loads for Buildings and Other Structures.
- ASTM A416/A416M – Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete.
- ASTM A475/475M – Standard Specification for Zinc-Coated Steel Wire Strand.
- ASTM A603/603M – Standard Specification for Zinc-Coated Steel Structural Wire Rope.
- ASTM A615/A615M – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

- ASTM A653/653M – Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by Hot Dip Process.
- ASTM A821/A821M – Standard Specification for Steel Wire, Hard Drawn for Prestressing Concrete Tanks.
- ASTM A884/A884M – Standard Specification for Epoxy Coated Steel Wire and Welded Wire Reinforcement.
- ASTM A1064/A1064M – Standard Specification for Carbon Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- ASTM C31/C31M – Standard Practice for Making and Curing Concrete Test Specimens in the Field.
- ASTM C33/C33M – Standard Specification for Concrete Aggregates.
- ASTM C39/C39M – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- ASTM C143/C143M – Standard Test Method for Slump of Hydraulic-Cement.
- ASTM C172/C172M – Standard Practice for Sampling Freshly Mixed Concrete.
- ASTM C231/C231M – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
- ASTM C881/C881M – Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
- ASTM D1056 – Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
- ASTM D1557 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
- ASTM D4397 – Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications.
- ASTM F593 Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
- AWS D1.2 – Structural Welding Code – Aluminum.
- "Earthquake Induced Sloshing in Tanks with Insufficient Freeboard" by P.K. Malhotra, Structural Engineering International, IASBSE, 3/2006 pp 222-225.
- OSHA 29 CFR 1910 – OSHA General Industry Regulations.
- U.S. Army Corps of Engineers CRD-C-572-74 – Specification for Polyvinylchloride (PVC) Waterstop

Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

820-1.3 MANUFACTURER QUALIFICATIONS

Tank Construction Company: Shall be a firm with a minimum of three years of experience in the design and construction of ANSI/AWWA D110 wire-wound, circular prestressed concrete

tanks with Type II core walls to ensure the Owner that it has the organization, technical skill, quality control, reliability, and financial stability to build and guarantee the tank in accordance with the quality required by these specifications. The tank construction company shall have built with its own resources and have under warranty, a minimum of ten (10) dome-covered prestressed concrete tanks of equal or greater size than that required for this project which meet these specifications and are now providing satisfactory service.

Construction: The entire tank, including all portions of the floor, wall, and roof shall be built by the tank construction company, using its own trained personnel and equipment.

Coatings: All Coating, Surface Preparation and Related Coating work shall be accomplished by an AMPP QP8 Certified Contractor. All tank coatings shall be included in the scope of the AMPP QP8 tank construction company. Subcontracting of this work is not allowed.

Design: All design work for the tank shall be performed by a professional engineer with no less than five years of experience in the design and construction of ANSI/AWWA D110 wire-wound, circular prestressed concrete tanks with Type II core walls. The professional engineer shall be a full-time staff member of the tank construction company and shall be licensed to work in the state where the project is located.

Tank manufacturer shall be The Crom Corporation, Gainesville, Florida, or approved equal.

820-1.4 SHOP DRAWINGS

After receipt of the Notice of Award, the Contractor shall furnish the Engineer a PDF of shop drawings from the manufacturer detailing the equipment or products to be furnished including dimensional data and materials of construction. The Engineer shall promptly review this data and return to the Contractor as approved, approved as noted, or rejected. Upon receipt of accepted shop drawings, the manufacturer shall proceed with order entry of the products and/or fabrication of the equipment.

All such submissions shall be sealed by a Licensed Professional Engineer licensed in the State of Louisiana. The shop drawings shall include a sealed certification listing the loading for which the tank has been designed and certifying that the design is in accordance with these specifications. Shop drawings shall include the following minimum components:

- Size, location and number of all reinforcing bars.
- Thickness of all parts of the tank structure including floor, core wall, dome, and covercoat.
- Prestressing schedule including number and placement of prestressing wires on the tank wall and total applied force per foot of wall height.
- Location and details of all accessories required.
- Concrete Data: Submit concrete design mixes including ingredient proportions, minimum cementitious content, and water/cementitious ratio in accordance with this Specification.
- Design Data: Submit structural calculations for the tank, signed and sealed by a professional engineer in accordance with this Specification.

820-2 MATERIALS

820-2.1 TANK DESIGN

The prestressed concrete tank shall have a wire-wound prestressed corewall in which a steel shell diaphragm of a height equal to the full wall height has been encased. All prestressing shall be done with high tensile wire permanently bonded to the tank wall. The tank floor shall be reinforced concrete. The tank roof shall be a free span concrete dome. The prestressed circular concrete ground storage tank and accessories shall be designed in accordance with AWWA D110-latest as supplemented herein.

- Roof loading from snow may be omitted.
- Wind loading: Risk Category – IV, Exposure Category – C
- Seismic forces and moments resulting from water sloshing and seismic accelerations of the tank dome, wall, and water loads shall be calculated in accordance with ACI 350.3 or ANSI/AWWA D110. If sufficient freeboard height is not provided to prevent uplift forces due to sloshing, the impulsive participation shall be increased due to the constrained motion of liquid, and the tank roof and its connection shall be designed to resist the uplift forces in accordance with P.K. Malhotra's "Earthquake Induced Sloshing in Tanks with Insufficient Freeboard".
- Platforms, ladders, and railing loading per AWWA D110 and OSHA.

Concrete membrane floors shall be a minimum of 4" thick and have a minimum thickness of 8" of concrete over all pipe encasements and around sumps. A minimum percentage of 0.60% reinforcing steel shall be used in the membrane floor. The minimum percentage shall apply to all thickened sections and shall extend a minimum of 2 ft into the adjacent membrane floor.

The wire-wound, prestressed concrete tank core wall shall be designed as a thin shell cylindrical element using shotcrete and an embedded, mechanically bonded, galvanized steel shell diaphragm. The design of the core wall shall take into account appropriate edge restraint. To compensate for bending moments, shrinkage, differential drying, and temperature stresses, the following minimum reinforcing steel shall be incorporated into the design: The top 2 ft of core wall shall have not less than 1% circumferential reinforcing. The bottom 3 ft of core wall shall have not less than 1% circumferential reinforcing.

The inside face of the core wall shall utilize the diaphragm as effective reinforcing. Additional vertical and horizontal reinforcing steel bars shall be used as required by design computations. Vertical reinforcing steel in the outside face of the core wall shall be: minimum of #4 bars at 12" center to center. Additional vertical and horizontal reinforcing steel bars shall be used as required by design computations. The minimum core wall thickness shall be 3½". Reinforcing steel used in the core wall shall be designed using a maximum allowable design tensile stress, f_s , of 18,000 psi. Allowable compressive stress in the core wall due to initial prestressing force, f_{gi} , shall be 1,250 psi + 75t psi/in. with 0.5 f'_{gi} maximum or less (where f'_{gi} is defined as compressive strength at time initial prestressing force is applied and t is the thickness of the core wall in inches or a maximum of 2,250 psi. Allowable compressive stress in the core wall due to final prestressing force, f_{gf} , shall be 1,250 psi + 75t psi/in. with 0.45 f'_{gf} maximum (where f'_{gf} is defined as compressive strength required for final prestressing force and t is the thickness of the core wall in inches) or a maximum of 2025 psi.

The dome roof shall be constructed of reinforced concrete and shall be circumferentially prestressed. Dome shell reinforcement shall consist of reinforcing bars or welded wire fabric, not galvanized. Bolsters for wire fabric and reinforcing bars shall be plastic. Wire ties shall be galvanized. The dome ring girder shall be prestressed with sufficient wire to withstand the dome dead load and design live loads. The ring girder shall have cross section suitable to accept the applied prestressing forces. The high water level in the tank shall be permitted to encroach on the dome shell no higher than the upper horizontal plane of the dome ring girder.

Overflow outlets or the overflow pipe shall be capable of providing an overflow open area three times the area of the largest influent pipe. Overflow outlets plus the dome ventilator shall be capable of providing an open area three times the area of the largest pipe.

The dome shall be designed as a free-span, spherical thin shell with one-tenth rise in accordance with the following: Typical Dome Design: The typical dome thickness and steel reinforcement shall meet the requirements of ANSI/AWWA D110. In all cases, the thickness of the dome shall be no less than 3".

Throughout the dome edge, the percentage of steel reinforcement, both radially and circumferentially, shall be no less than 0.25% of the gross cross sectional area of concrete. Along the dome edge, steel reinforcement shall be distributed between the upper and lower layers unless finite element analysis calculations indicate that tensile stress does not exist in the concrete along the bottom face of the dome edge. In that case, only top bars are required radially and circumferentially. In addition, radial and circumferential reinforcing bars will not be required along the bottom face of the dome edge where the calculated typical dome thickness is less than 75% of the actual typical dome thickness. Where reinforcing bars are required in the bottom layer, they shall be placed near the tank wall to insure adequate development at the intersection between dome and wall. In all cases, the percentage of circumferential steel reinforcement in the effective dome ring shall be no less than one percent of the gross cross sectional area of concrete. The effective dome ring is defined as $\frac{1}{4}$ of the haunch length not to exceed 2 ft'. Where bottom dome edge steel reinforcement is required, vertical steel reinforcement along the inside face of the tank wall shall be no less than 0.5% of the cross sectional area of wall shotcrete.

Circumferential prestressing of the tank shall be achieved by the application of cold-drawn, high-carbon steel wire placed under high tension. A substantial allowance shall be made for prestressing losses due to shrinkage and plastic flow in the shotcrete and due to relaxation in the prestressing steel. The prestressing design shall conform to the following minimum requirements: Working stress for the tank wall, f_s , shall be a maximum of 115,000 psi. Working stress for the dome ring, f_{sd} , shall be a maximum of 120,000 psi. The allowable design tensile stress in the prestressing wire before losses, f_{si} shall be 145,600 psi or no greater than 0.63 f_u , where f_u is defined as the ultimate strength of the wire. Areas to be prestressed will contain no fewer than 10 wires per foot of wall for 8 gauge and 8 wires per foot of wall for 6 gauge. A maximum of 24 wires per layer per foot for 8 gauge and 20 wires per layer per foot for 6 gauge will be allowed.

When it is necessary for a pipe to pass through the tank wall, the invert of such pipe or sleeve shall provide no less than 18" clear space at the bottom of the wall to provide sufficient clear area for the prestressing wires. The prestressing wires required at the pipe elevation shall be distributed into circumferential bands immediately above and below the opening to maintain the required prestressing force while leaving an unbanded strip around the entire tank.

Unbanded strips shall have a vertical dimension of no more than 36" unless an axi-symmetric shell analysis is performed to account for compressive forces plus shear and moments caused by displacement of the prestressing wires into adjacent bands.

820-2.2 PERFORMANCE

Performance of the materials used in the tank construction shall conform to the minimum requirements of this specification. Substitutions to the materials in this specification may only be made if submitted in writing and approved by the Engineer.

820-2.3 SUBBASE

The base material should consist of a clean, well-compacted, angular or sub-angular material with a minimum thickness of 6 in. The gradation of the base material should be selected to permit free drainage without the loss of fines or intermixing with the subgrade material. The maximum particle size of the base material should be limited to provide a relatively level working surface without potential intrusion of the base materials into the membrane floor slab concrete. Base material should be compacted to 95 percent of the maximum laboratory density determined by ASTM D1557.

820-2.4 CONCRETE

Concrete used for construction of the tank shall conform to the following:

- Concrete shall conform to ACI 301/301M.
- All concrete shall utilize either Type I/II or Type IL cement.
- A maximum of 25% of cementitious material may be fly ash.
- Admixtures other than air-entraining and water reducing admixtures will not be permitted unless approved by the engineer.
- Coarse and fine aggregate shall meet the requirements of ASTM C33/C33M.

Mix	Compressive Strength (psi)	Minimum Cement Content (lbs)	AASHTO Aggregate	Max. W/C Ratio	Air Content (%)	Slump (in)
Floor	4,000	560	#57	0.45	5 +/- 1.5	4"+/-1"
Dome	4,000	600	#8	0.45	5 +/- 1.5	4"+/-1"

820-2.5 SHOTCRETE

Shotcrete used for construction of the tank shall conform to the following:

- Shotcrete shall conform to the requirements of ACI 506.2 except as modified herein.
- All shotcrete mixes shall utilize either Type I/II or Type IL cement.
- A maximum of 25% of cementitious material may be fly ash.

- All shotcrete in contact with diaphragm or prestressing wire shall be proportioned to consist of not more than three parts sand to one part Portland cement by weight. All other shotcrete shall be proportioned to consist of not more than four parts sand to one part Portland cement by weight.
- Admixtures will not contain more than trace amounts of chlorides, fluorides, sulfides or nitrates.
- Fine aggregate shall meet the requirements of ASTM C33/C33M.

Mix	Compressive Strength (psi)	Max. W/C Ratio	Air Content (%)	Slump (in)
Core Wall	4,000	0.42	5 +/- 1.5	5"+/-1"
Covercoat	4,000	0.42	5 +/- 1.5	5"+/-1"

820-2.6 MOISTURE BARRIER

The moisture barrier shall be polyethylene, Class A, conforming to ASTM D4397 with a minimum thickness of 6-mils.

820-2.7 PRESTRESSED REINFORCEMENT

The prestressing wire shall conform to the requirements of ASTM A821/A821M, Type B. The prestressing wire size shall be 0.162" (8 gauge), 0.192" (6 gauge) or larger, but no larger than 0.250". The ultimate tensile strength, f_u shall be, 231,000 psi or greater for 8 gauge wire, 222,000 psi or greater for 6 gauge. Splices for horizontal prestressed reinforcement shall be ferrous material compatible with the prestressing reinforcement and shall develop the full strength of the wire.

820-2.8 NON-PRESTRESSED REINFORCEMENT

Non-prestressed mild reinforcing steel shall be new billet steel meeting the requirements of ASTM A615/A615M with a minimum yield strength, f_y , of 60,000 psi. Welded wire reinforcing shall be plain wire conforming to the requirements of ASTM A1064/A1064M with a minimum yield strength, f_y , of 65,000 psi.

820-2.9 GALVANIZED STEEL DIAPHRAGM

The galvanized steel diaphragm used in the construction of the core wall shall be 26 gauge with a minimum thickness of 0.017 in. conforming to the requirements of ASTM A653/A653M. Weight of zinc coating shall be not less than G90 of Table 1 of ASTM A653/A653M. The diaphragm shall be formed with re-entrant angles and erected so that a mechanical key is created between the shotcrete and diaphragm. The diaphragm shall be continuous to within 3 in. of the top and bottom of the wall. Horizontal joints or splices will not be permitted. All vertical joints in the diaphragm shall be rolled seamed, crimped and sealed watertight using epoxy injection. In all tanks designed to use a waterstop at the floor/wall joint, the steel shell diaphragm shall be epoxy bonded to the waterstop.

820-2.10 PVC WATERSTOPS, BEARING PADS AND SPONGE FILLER

Plastic waterstops shall be extruded from an elastomeric plastic material of which the base resin is virgin polyvinylchloride (PVC). PVC waterstops shall conform to the requirements of CRD-C-572-74. The profile and size of the waterstop shall be suitable for the hydrostatic pressure and movements to which it is exposed. Bearing pads used in floor/wall joints shall consist of neoprene, natural rubber or polyvinyl chloride. Sponge filler at the floor/wall joint shall be closed-cell neoprene.

820-2.11 EPOXY

Epoxy sealants shall conform to the following:

- Epoxy shall conform to the requirements of ASTM C881/C881M.
- Epoxy used for sealing the diaphragm shall be Type III, Grade 1, and shall be 100% solids, moisture insensitive, low modulus epoxy.
- Epoxy used for placing the waterstop shall be Type II, Grade 2, and shall be 100% solids, moisture insensitive, low exotherm epoxy.
- When pumped, maximum viscosity of the epoxy shall be 10 poises at 77°F.
- The epoxy sealants used in the tank construction shall be suitable for bonding to concrete, shotcrete, PVC and steel.

Bonding epoxy shall conform to the following:

- Epoxy resins used for enhancing the bond between fresh concrete and hardened concrete shall conform to the requirements of ASTM C881/C881M.
- Epoxy resins shall be a two-component, 100% solids, moisture-insensitive epoxy and shall be Type II, Grade 2.

820-2.12 SEISMIC RESTRAINT CABLES

When required by design, seismic restraint cables shall be ½-inch diameter, seven-wire strand conforming to ASTM A416/A416M, prior to galvanizing. The strand shall be galvanized in accordance with ASTM A475, or ASTM A603, with a minimum weight per unit of coated wire surface, Class A. The minimum yield strength of the seven-wire strand shall be 270,000 psi.

820-2.13 NOZZLES & OVERFLOW

Tank nozzles shall be provided as shown on the Drawings. Nozzles shall include vortex breakers and flanges as shown on the Drawings. Size and projection shall be as shown on the Drawings.

Through-wall pipe sleeves shall be Type 316 stainless steel sleeves with neoprene modular seal units. Waterstop rings on wall-pipes shall be Type 316 stainless steel.

Pipe shall be Class 53 ductile iron.

Provide support brackets to support the overflow piping from the tank sidewall.

Accessory hardware, unless otherwise noted, shall be Type 316 stainless steel conforming to ASTM F593.

820-2.14 ACCESS

Sidewall manway(s) and roof hatch(es) shall be provided as shown on the Drawings. Manways shall be 1' 5" x 4' 4" rectangular Type 316 stainless steel wall manhole for access to the interior of the tank. The cover shall also be of Type 316 stainless steel. The wall manhole shall be designed to resist hydraulic loading without excessive deflection.

The roof opening shall be placed near the outside tank ladder and shall be provided with a hinged cover and a hasp for locking. The opening shall have a curb at least four (4") inches in height, and the cover shall have a downward overlap of at least two (2") inches. Roof hatch cover shall be fabricated from fiberglass.

820-2.15 VENT

A properly sized vent(s) in accordance with AWWA D110 shall be furnished and installed above the maximum water level of sufficient capacity so that at maximum design rate of water fill or withdrawal of 1,500 gpm excessive tank pressurization or vacuum does not occur. Minimum vent size shall be 20" diameter. The overflow pipe shall not be considered to be a tank vent.

The vent shall be constructed of fiberglass such that the hood can be unbolted and used as a secondary roof access. The vent shall be so designed in construction as to prevent the entrance of birds and/or animals by including an expanded aluminum screen (½ inch) opening. A 24 mesh aluminum insect screen shall be provided inside the aluminum bird screen.

820-2.16 LADDERS

Interior and/or exterior ladder(s) shall be provided as shown on the Drawings. Rungs shall be slip resistant.

Exterior ladder shall be fabricated from 6061-T6 and 6063-T6 aluminum and shall conform to all applicable OSHA standards. The ladder shall have an aluminum safety cage and lockable security gate and/or a safety climbing device in accordance with all applicable OSHA standards. Aluminum handrail shall be fabricated in 20 ft typical sections from 6061-T6 aluminum and shall conform to all applicable OSHA standards. Aluminum accessories shall be shop fabricated and fully welded. All welding shall be in accordance with American Welding Society (AWS) D1.2 to fuse materials without distortion of the material. Mechanical splices shall only be used at field splice locations. Aluminum accessories shall have a "mill" finish. Aluminum surfaces in contact with concrete shall be protected with a coat of bituminous paint.

Interior ladder shall be fabricated from fiberglass shall conform to all applicable OSHA standards. The ladder shall have a safety climbing device manufactured from Type 316 stainless steel as required to meet applicable OSHA standards.

Accessory hardware, unless otherwise noted, shall be Type 316 stainless steel conforming to ASTM F593.

820-2.17 SAMPLE TAP

Provide one 1/2" NPT plain stainless steel smooth nozzle sample tap on 1" NPT shell nozzle with stainless steel ball valve and pipe nipples for LDH sampling purposes. Sampling tap shall

be positioned such that there is a minimum 12" clear space beneath the nozzle to accommodate sampling containers.

820-2.18 IDENTIFICATION PLATE

A manufacturer's nameplate shall list the tank serial number, tank diameter and height, and maximum design capacity. The nameplate shall be affixed to the tank exterior sidewall at a location approximately 5 ft. from grade elevation in a position of unobstructed view.

820-3 **INSTALLATION**

820-3.1 EXAMINATION

All subgrade elevations shall be verified prior to starting tank construction.

820-3.2 FLOOR INSTALLATION

The subgrade shall be prepared by fine grading to ensure proper placement of reinforcing steel with proper bottom cover. A 6-mil polyethylene vapor-barrier shall be placed after subgrade preparation has been completed. Form and screed boards shall be of proper thickness and sufficiently braced to ensure that the floor is constructed within proper thickness tolerances. Plate bolsters shall be used to support reinforcing steel supported directly on the subgrade to ensure positive control of placement of reinforcing steel. The floor shall be vibratory screeded to effect consolidation of concrete and proper encasement of floor reinforcing steel. The floor shall be water cured for a minimum of 7 days after casting. The floor shall receive a light broom finish.

820-3.3 CORE WALL INSTALLATION

The diaphragm shall be protected against damage before, during, and after erection. Nail or other holes shall not be made in the diaphragm for erection except in the top 3 inches. Holes shall not be made in the diaphragm except for inserting wall pipes or sleeves, reinforcing steel, bolts, or other special appurtenances. Such penetrations shall be sealed with an epoxy sealant.

All shotcrete shall be applied by or under direct supervision of experienced nozzle men certified by the American Concrete Institute (ACI) as outlined in ACI certification publication CP-60. Each shotcrete layer shall be broomed prior to final set to effect satisfactory bonding of the following layer. No shotcrete shall be applied to reinforcing steel or diaphragm that is encrusted with overspray. No less than ½" thick shotcrete shall separate reinforcing steel and prestressing wire. The diaphragm shall be encased and protected with no less than 1" of shotcrete in all locations. The interior shotcrete shall receive a light broom finish.

Interior and exterior portions of the shotcrete wall shall be water cured for a minimum of 7 days or until prestressing is completed.

820-3.4 EPOXY INJECTION

Epoxy injection shall be carried out from bottom to top of wall using a pressure pumping procedure. Epoxy injection shall proceed only after the diaphragm has been fully encased, inside and outside, with shotcrete.

820-3.5 DOMESTALLATION

All concrete shall be consolidated by means of a vibrator for proper encasement of reinforcing steel and welded wire fabric. All surfaces at the joint between the wall and the dome shall be coated with bonding epoxy. Plastic bolsters shall be used to support reinforcing steel and welded wire reinforcement to ensure positive control on placement of steel. The exterior surface of the dome shall receive a light broom finish. The dome shall be water cured for a minimum 7 days after casting or until dome band prestressing is completed.

820-3.6 PRESTRESSING

The initial tension in each wire shall be read and recorded to verify that the total aggregate force is no less than that required by the design. Averaging or estimating the force of the wire on the wall shall not be considered satisfactory evidence of correct placement of prestressing wires.

Placement of the prestressing steel wire shall be in a continuous and uniform helix of such pitch as to provide in each lineal foot of core wall height an initial force and unit compressive force equal to that shown on the design drawings. Splicing of the wire shall be permitted only when completing the application of a full coil of wire or when removing a defective section of wire.

Shotcrete shall be used to completely encase each individual wire and to protect it from corrosion. To facilitate this encasement, the clear space between adjacent wires is to be no less than one wire diameter.

Prestressing shall be accomplished by a machine capable of continuously inducing a uniform initial tension in the wire before it is positioned on the tank wall. Tension in the wire shall be generated by methods not dependent on cold working or re-drawing of the wire. In determining compliance with design requirements, the aggregate force of all tensioned wires per foot of wall shall be considered rather than the force per individual wire, and such aggregate force shall be no less than that required by the design and as shown on approved drawings.

The tank construction company shall supply equipment at the construction site to measure tension in the wire after it is positioned on the tank wall. The stress measuring equipment shall include: electronic direct reading stressometer accurate to within 2%, calibrated dynamometers and a test stand to verify the accuracy of the equipment.

After circumferential prestressing wires have been placed, they shall be protected by encasement in shotcrete. This encasement shall completely encapsulate each wire and permanently bond the wire to the tank wall.

When multiple layers of wire are required, shotcrete cover between layers shall be no less than 1/8" thick.

820-3.7 COVERCOAT

After all circumferential prestressing wires have been placed, a shotcrete cover having a thickness of no less than 1" shall be placed over the prestressing wires. Horizontal sections

of the wall shall form true circles without flat areas, excessive bumps or hollows. The covercoat shall receive a sliced trowel finish.

820-3.8 WALL OPENINGS

All wall pipes, sleeves and manholes passing through the wall shall be sealed to the diaphragm by epoxy injection.

820-3.9 CONCRETE & SHOTCRETE TESTING

Compression Tests:

- Compression test specimens shall be taken during construction from the first placement of each class of concrete specified herein and at intervals thereafter as selected by the Engineer to ensure continued compliance with these Specifications. At least one set of test specimens shall be made for each 50 yards of concrete/shotcrete placed. Each set of test specimens shall be a minimum of 5 cylinders.
- Compression test specimens for concrete/shotcrete shall conform to ASTM C172/C172M for sampling and ASTM C31/C31M for making and curing test cylinders. Test specimens shall be 6-inch diameter by 12-inch high or 4-inch diameter by 8-inch high cylinders.
- Compression test shall be performed in accordance with ASTM C39/C39M. Two test cylinders will be tested at 7 days and two at 28 days. The remaining cylinder will be held to verify test results, if needed.

Air Content Tests (concrete only):

- Air content tests shall conform to ASTM C231/C231M (Pressure Method for Air Content).
- Tests for air content shall be made prior to concrete placement and whenever compression test specimens are made.

Slump Tests (concrete only):

- Slump tests shall be made in accordance with ASTM C143/C143M.
- Slump tests shall be made whenever compression test specimens are made.

820-3.10 LEAK TESTING

Upon completion of the erection, the tank shall be tested for leakage. Floor shall be clean and free from dirt, foreign substances, and debris.

The tank shell shall be tested by filling the tank with potable water and any leaks or other defects which may appear will be repaired so as to leave the tank in absolutely first-class condition. The leak test can be performed along with the disinfecting of the tank; however, if the need arises that the tank has to be entered into to correct a leak, then the disinfecting must be redone.

Leak testing shall be completed as follows:

- Fill the tank with water to the maximum water level and let it stand for a minimum of 24 hours.

- Inspect the exterior of the tank wall and footing for damp spots. Damp spots shall be defined as spots where moisture can be picked up on a dry hand, the source of which is from inside the tank.
- Leakage through the wall or wall-base joint shall be repaired and the tank shall be retested using the above procedure.

820-3.11 DISINFECTION

Disinfecting of the tank shall be with potable water in accordance with AWWA C652 Method 2, (latest revision), and as follows. The tank shall first be scrubbed clean before disinfecting. A solution of 200-mg/L available chlorine shall be applied directly to the surfaces of all parts of the storage facility that would be in contact with water when the storage facility is full to the overflow elevation. The chlorine solution may be applied with suitable brushes or spray equipment. The solution shall thoroughly coat all surfaces to be treated, including the inlet and outlet piping, and shall be applied to any separate drain piping such that it will have available chlorine of not less than 10 mg/L when filled with water.

The disinfected surfaces shall remain in contact with the strong chlorine solution for at least 30 minutes, after which potable water shall be admitted, the drain piping purged of the 10 mg/L chlorinated water, and the storage facility then filled to its overflow level. Following this procedure, and subject to satisfactory bacteriological testing and acceptable aesthetic quality, such water may be delivered to the distribution system.

Disposal of heavily chlorinated water from the tank disinfection process shall be in accordance with Paragraph 4.3.5.1 of AWWA Standard C652, the requirements of the LDEQ, or other state or federal authorities, whichever is stricter.

820-3.12 HEALTH TESTING

Water from the ground storage tank shall not be furnished for consumer's use until water samples analyzed by a LDH-OPH Approved Chemical Laboratory show conformance with LAC 51:XII.225.T. Engineer shall be furnished a copy of the laboratory reports. The expense of disinfecting and lab analyses shall be borne by the Contractor.

820-3.13 WARRANTY

The tank construction company shall provide a warranty for workmanship and materials on the complete structural portion of the tank for a five-year period starting 6 months after the crew's demobilization, after a successful leak test, or Substantial Completion, whichever is sooner. The warranty shall not apply to any accessory, equipment or product that is not a structural part of the tank and is manufactured by a company other than the tank construction company. The tank construction company shall provide a written company warranty to cover this five-year period.

If any leakage or other defects appear within the five-year period, the tank construction company shall promptly repair the tank at its own expense upon written notice by the Owner that such defects have been found. Leakage is defined as a stream flow of liquid appearing on the exterior of the tank, the source of which is from the inside of the tank. The tank construction company shall not be responsible for, nor liable for, any subsurface condition.

820-4 MEASUREMENT & PAYMENT

When listed separately in the Bid Form, items will be measured and paid as a separate unit or lump sum price. Payment for unit price items will be for the actual amount or size installed. When no separate item is listed in the Bid Form, no separate measurement shall be made. The cost of Work not listed separately in the Bid Form shall be included in another item(s) to which it most nearly relates. Contractor's prices shall include all necessary costs to complete the Work in accordance with the Plans and Specifications.

TECHNICAL PROVISIONS
SECTION 824
GENERAL SPECIFICATIONS FOR ELECTRICAL INSTALLATION

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TECHNICAL PROVISIONS
SECTION 824
GENERAL SPECIFICATIONS FOR ELECTRICAL INSTALLATION

PART 1 GENERAL

1.01 GENERAL

- A. The Electrical Drawings and Specifications under this division an integral part of the Contract Documents. The Drawings and Specifications of other divisions of this contract, as well as supplements issued thereto, information to bidders and pertinent documents issued by the Owner's representative are a part of these drawings and specifications and shall be complied with in every respect. All the above documents will be on file at the office of the Owner's representative and shall be examined by all bidders. Failure to examine all Contract Documents shall not relieve the responsibility or be used as a basis for additional compensation due to omission of details of other requirements in these Contract Documents from the Electrical documents.
- B. The Contractor shall furnish all work, labor, tools, superintendence, material, equipment, and operations necessary to provide for complete and workable electrical systems as defined by the contract documents.
- C. The Contractor shall be responsible for inspecting the project site and checking the existing conditions and ascertaining the conditions to be met for installing the work and adjusting his bid accordingly.
- D. It is the intent of the Contract Documents that upon completion of the electrical work, each entire system shall be in a finished and workable condition.
- E. All work that may be called for in the Specifications but not shown on the Drawings; or, all work that may be shown on the drawings but not called for in the Specifications, shall be performed by the Contractor as if described in both. Should work be required which is not set forth in either document, but which work is nevertheless required for fulfilling of the intent thereof; then, the Contractor shall perform all work as fully as if it were specifically set forth in the Contract Documents.
- F. The definition of terms used throughout the contract documents shall be as specified by the following agencies:
 - 1. Underwriters Laboratories (UL)
 - 2. National Electrical Manufacturers Association (NEMA)
 - 3. American National Standards Institute (ANSI)
 - 4. Insulated Cable Engineers Association (ICEA)
 - 5. National Electrical Code (NEC)
 - 6. National Fire Protection Association (NFPA)

- G. The use of the terms: "as (or where) indicated"; "as (or Where) shown"; "as (or Where) specified"; or "as (or where) scheduled" shall be taken to mean that the reference is made to the Contract Documents, either on the drawings or in the specifications, or both documents.
- H. The use of the words "furnish," provide," or "install" shall be taken to mean that the item or facility is to be both furnished and installed under this Section unless stated to the contrary that the item or facility is to be either furnished under another Section or under another Contract, furnished under this Section and installed under another Section or under another Contract.

1.02 PERMITS, CODES AND REGULATIONS

- A. Secure all permits, licenses, and inspection as required by all authorities having jurisdiction. Give all notices and comply with all laws, ordinances, rules, regulations, and contract requirements bearing on the work.
- B. The minimum requirements of the electrical systems installations shall conform to the latest edition of the National Electrical Code as well as state and local codes.
- C. Codes and ordinances having jurisdiction and specified codes shall serve as minimum requirements; but, if the Contract Documents indicate requirements which are in excess of those minimum requirements, then the requirements of the Contract Documents shall be followed. Should there be any conflicts between the Contract Documents and codes, or any ordinances, report these with bid.
- D. Determine the exact requirements for the utility service connections and metering facilities as set forth by the utilities that will serve the project and pay for and perform all work as required by those utilities.

1.03 STANDARDS

- A. All materials and equipment shall conform to the requirements of the Contract Documents. They shall be new, free from defects, and they shall conform to the following standards where these organizations have set standards:
 - 1. Underwriters Laboratories, Inc. (UL)
 - 2. National Electrical Manufacturer's Association (NEMA)
 - 3. American National Standards Association (ANSI)
 - 4. Insulated Cable Engineers Association (ICEA)
 - 5. All material and equipment, of the same class shall be supplied by the same manufacturer, unless specified to the contrary.
 - 6. All products shall bear UL labels where standards have been set for listing.

1.04 SHOP DRAWINGS AND SUBMITTALS

- A. Shop drawings and submittals shall conform to the quality and quantity requirements detailed in Division 01.

1.05 RECORD DRAWINGS

- A. The Contractor shall keep one separate set of blue-line prints for making construction notes and mark-ups as detailed in Division 01, and shall include the following:
 - 1. Show conduit routing and wiring runs as constructed and identify each.
 - 2. Show all terminal number and schematic changes.
 - 3. Record all deviations from the Contract Documents.
 - 4. Submit set of marked-up drawings for review.

1.06 OPERATIONS AND MAINTENANCE MANUALS

- A. Submit operation and maintenance data as detailed in Division 01.

1.07 ACCEPTANCE AND SUBSTITUTIONS

- A. All manufacturers named are a basis as a standard of quality and substitutions of any equal product will be considered for acceptance unless prohibited under other divisions of these Specifications. The judgement of equality of product substitutions shall be made by the Engineer.
- B. Substitutions after award of contract shall be made only within sixty days after the award of contract. Furnish all required supporting data. The submittal of substitutions for review shall not be cause for time extensions.
- C. Where substitutions are offered, the substituted product shall meet the product performance as set forth in the specified manufacturer's current catalog literature, as well as meeting the details of the contract documents.
- D. The details on the drawings and the requirements of the specifications are based on the first listed item of material or equipment; if any other than the first listed materials or equipment is furnished, then assume responsibility for the correct function, operation, and accommodation of the substituted item. In the event of misfits or changes in work required, either in this Section or other Sections of the contract, or in both; bear all costs in connection with all changes arising out of the use of other than the first listed item specified.
- E. Substitutions of products under another Section may occur. Make necessary adjustments and additions to work under this Section to accommodate those substitutions. Such adjustments and additions shall be performed in compliance with specifications at no additional charge.

1.08 CERTIFICATIONS

- A. The General Contractor via his subcontractors shall submit the following certifications upon completion of the project.
 - 1. All motor overload heaters and circuit breakers have been properly selected and installed. Attach a completed form "Motor Overload Heater and Circuit Breaker Data Sheet".

2. All wiring has been properly connected to all equipment in accordance with the manufacturer's recommendations and the plans and specifications.
3. All electrical systems and subsystems are operating properly and have been operationally tested by simulations of all possible operating conditions.
4. All electronic instruments and switches are calibrated and functioning properly.
5. The emergency generation system and transfer switch (if specified) is operating properly and has been tested at maximum expected operating conditions.
6. The Graphic Display Panel (if specified) has been tested and is functioning properly.
7. The Distributed Control System (if specified) has been properly connected to all required equipment, is operating properly and has been operationally tested by simulation of all possible operating conditions.
8. Other certifications as to proper electrical operation as deemed necessary by the Engineer.

1.09 COOPERATION

- A. Cooperate with all other trades so as to facilitate the general progress of the work. Allow all other trades every reasonable opportunity for the installation of their work and the storage of their materials.
- B. The work under this section shall follow the general building construction closely. Set all pipe sleeves, inserts, etc., and see that openings for cases, pipes, etc. are provided before concrete is placed or masonry installed.
- C. Work with other trades in determining exact locations or outlets, conduits, fixtures, and pieces of equipment to avoid interference with lines as required to maintain proper installation of other work.
- D. Make such progress in work that will not delay the work of other trades. Schedule the work so that completion dates as established by the Engineer are met. Furnish sufficient labor or work overtime to accomplish these requirements if necessary or directed to do so.

1.10 ADDITIONAL REQUIREMENTS

- A. Electrical wire and conduit schedules, and interconnection drawings are prepared by the Engineer to assist the electrical subcontractors in estimating the cost of the project and are based on the latest information available from the vendors at the time of design. Once shop drawings are received, changes may be required on the project external wiring to accommodate their latest design and to make the system function properly.
- B. It shall be the Contractors responsibility to check with the various vendors before bidding the project and to include monies in his bid to accommodate these requirements since no changes to the contract price will be allowed for these changes.

1.11 ELECTRICAL EQUIPMENT REQUIREMENTS

- A. The plant electrical system is custom designed to the specific requirements of the Owner and the Engineer using a sophisticated control system. The vendors shall custom design their electrical

equipment and panels to match these electrical requirements. This means that it is highly unlikely that the vendors standard panels and electrical equipment will be compatible with the requirements of this project. Shop drawings shall be submitted showing external wiring terminals and shall properly identify the devices to which they are to be interconnected. At a minimum the drawings shall be prepared with the same engineering effort as can be expected to be utilized in motor control center class 2, type B wiring. Wiring and elementary and control drawings shall be prepared using drawing sizes sufficient to show wiring details clearly and shall have the Owner's name and project on each sheet. All options furnished shall be identified. Any item not furnished shall be entirely deleted from the drawing. Drawings that indicate such things as "if supplied" "these models only" "optional" etc. will be rejected. Any drawings submitted where it is obvious that no effort was made to properly prepare them for easy checking by the Engineer will be rejected.

- B. Shop drawings, unless mark-ups are very trivial, will not be returned "approved as noted". They will be returned for resubmittal as many times as necessary. Therefore, make every effort to comply with the requirements of this project on the first submittal in order to avoid project delays.
- C. The Contractor shall include monies in his bid to strictly adhere to the above.

PART 2 PRODUCTS

2.01 WIRE AND CABLE

- A. Single Conductor: All single conductor wire for power and control 480 volts and below shall be stranded copper 75 degree C 600 volts U.L. for wet and dry locations type THWN, THWN-2, XHHW or XHHW-2. Wire for 120 volt general lighting may be solid copper 600-volt type THW or THWN as permitted by NFPA 70.
- B. Multi-Conductor: Control cable shall be stranded copper 600 volt U.L. type TC 75 Degrees C wet, 90 degrees C dry and shall consist of individual color coded conductors insulated with 15 mils PVC insulation and 4 mils clean nylon jacket, moisture resistant fillers, lapped core tape and overall PVC jacket.
- C. Instrument Cable: Instrument cable for 4-20 ma service unless specified otherwise herein or on drawings shall be single twisted pair stranded copper 90 degree C 600 volt U.L. with 21 mils PVC insulation and nylon jacket, aluminum polyester shield tape and 45 mils overall jacket. Size shall be #16 AWG unless shown otherwise or on drawings.
- D. High Voltage Cable: High voltage cable shall be as specified in another section of these specifications.

2.02 CONNECTORS

- A. Mechanical connectors shall be copper alloy bolted pressure type with bronze hardware. Such connectors unless otherwise indicated shall be Square D, OZ/Gedney, T&B, or equal.

<u>Type</u>	<u>Manufacturer</u>
Single conductor to flat plate connector	Square D Type LU, OZ Type XLH, or equal
Multiple conductor to flat plate connector	Square D LU Series, T&B Type 32000 DB, or equal
One-bolt parallel connector	Type T, or equal
Split-bolt parallel connector	Square D Type CPS, T&B Type TP, or equal
Two-bolt parallel connector	Square D Type KR, OZ Type 5TS, or equal
Splice connector	Square D Type SS, OZ Type XW, or equal
Cross-connector	Square D Type XP, OZ Type T, or equal
Ground rod connector	Square D Type CG, OX Type ABG, or equal
Flush floor connector	Square D Type GCJ, OZ Type VG, or equal

- B. Insulated spring wire connectors shall be plated spring steel with thermoplastic jacket. Connectors shall be rated at 150 degrees C continuous.
- C. Insulated set-screw connectors shall consist of copper body with flame retardant, 600 V class insulated shell that threads over set-screw body.
- D. Terminal connectors for flat-head terminal screws shall be locking spade type with vinyl insulated compression indent tubular wire shaft.
- E. Terminal strip connectors shall be channel-mounted type with tin-plated solderless box lugs contained within nylon-insulated separable carriers.
- F. Furnish terminal strips complete with channels, channel mounting hardware, and closures, and fittings.

2.03 INSULATING PRODUCTS

- A. General purpose electrical tape shall be 7-mil thick stretchable vinyl plastic with pressure adhesive backing, 3M "Scotch #33, Plymouth "Slipknot Grey", or equal.
- B. Insulating void-filling tape shall be stretchable ethylene propylene rubber with high-tack and fast fusing surfaces. Tape shall be rated for 90 degrees C continuous, 130 degrees C overload and it shall be moisture-proof. Void-filling tape shall be 3M "Scotch #23," Plymouth "Plysafe", or equal.
- C. Arc-proof tape shall be flame-retardant, self-extinguishing compound. Tape shall be resistant to ultraviolet, water, salt water, raw sewage and acids. Arc-proof tape shall be "3M" Scotch #7700, Plymouth "Plyarc", or equal.

- D. Insulation putty filler tape shall be elastic, moisture proof rubber compound suitable for bedding and rounding out irregular surfaces.
- E. Conduit insulation putty shall be waterproof, stretchable, non-hardening compound suitable for duct seal.

2.04 CONDUIT DETAIL

- A. Specifications will indicate the type of conduit system to be used. Liquidtight flexible metallic conduit shall be U.L. listed and shall consist of a metallic interlocking core with an extruded thermoplastic cover.

2.05 CONDUIT FITTINGS

- A. Conduit fittings shall be compatible with the conduit system used. Outdoor enclosures shall be weatherproof. Insulating bushings shall be non-combustible, high-impact thermosetting phenolic with 150 degrees C temperature rating and shall not support combustion.

2.06 CONDUIT BODIES AND BOXES

- A. Conduit bodies and boxes for pulling and installation of outlets shall be compatible with the conduit system and shall be as follows:

<u>CONDUIT SYSTEM</u>		
<u>Item</u>	<u>Galvanized Rigid Steel</u>	<u>Rigid Aluminum</u>
Outlet Bodies	Threaded zinc coated malleable iron w/ gasketed cast metal covers, Crouse Hinds Form 7, or equal	Threaded copper free aluminum w/ gasketed sheet aluminum covers, Crouse Hinds Form 9, or equal
Outlet Boxes	Same as above except Crouse Hinds FD, FS, and DS, or equal. Outdoor or wet locations to have outdoor covers	Threaded copper free aluminum w/ gasketed cast aluminum outdoor covers, Crouse Hinds FD, FS, and DS, or equal

2.07 SUPPORT DEVICES

- A. Single opening slotted channel supports shall be 2" deep x 1 5/8" wide. Double opening slotted channel supports shall be 4" deep x 1 5/8" wide. All slotted channel members shall be manufactured of ASTM 6063-T-6 aluminum. Furnish nuts, clamps, and hardware that shall be compatible with the slotted channel members.
- B. Conduit clamps for use with slotted channel members shall consist of locking aluminum straps with aluminum hardware. All such straps and hardware shall be manufactured of hardened aluminum alloy with less than 0.5% copper content.

- C. After-set concrete inserts shall be expansion-shield type with stainless steel hardware, 500 pounds minimum pull-out resistance.
- D. Beam clamps shall be hot-dipped galvanized malleable iron. Furnish right angle, edge, or parallel types as required.
- E. Nest-back supports shall consist of one-hole pipe clamp with conduit wall spacer clamp-back, all manufactured of hot-dipped galvanized malleable iron.
- F. One-hole pipe clamps shall be manufactured of hot-dipped galvanized malleable iron.
- G. Surface mounted swivel joints shall be double closed "U" brackets of plated malleable iron with attachment openings top and bottom.
- H. Adjustable screw-mounted swinging hangers shall be manufactured of plated steel. Mounting bracket shall have four screw-holes.
- I. All thread rod shall be stainless steel, 3/8" diameter (min. size).

2.08 FLOOR BOXES

- A. Floor boxes where shown on the plans shall be Walker or equal Type RFB with RAKM11 flush access hatch with carpet trim (or tile trim where tile is used). Unless exact dimensions are shown on the drawings, the exact location of the boxes shall be approved by the Engineer after the furniture type is selected.
- B. Floor boxes shall be complete with all required receptacle, telephone, intercom, computer, etc. internal brackets and divider plates.

2.09 CONNECTING LUGS

- A. In many instances, due to the long distances between equipment and voltage drop limitation, larger wire sizes may be required that would normally be expected for some items of equipment. The Contractor and equipment vendor shall identify these requirements and provide proper lugs to match the wire sizes.

2.10 IDENTIFYING AND TAGGING

- A. Individual phases and routing of each power and control circuit shall be identified by appropriate identifying permanent tags, at points near each end of the cables. Yellow plastic tags 2 1/2" x 3 1/2" available from Tags Unlimited., New Orleans, LA or others shall be used for cable I.D. A Sanford Sharpie or equal fine point marker shall be used for writing.
- B. All equipment and electrical devices shall be identified. The Contractor and manufacturer shall be responsible for properly identifying and tagging equipment as to safe operation under adverse conditions by personnel normally associated with the proposed facility. Additional signs as the

Engineer may require for safety shall be furnished and installed by the Contractor at no additional costs.

- C. Voltage warning labels where shown or required by N.E.C or local codes shall be waterproof vinyl with permanent red letters "DANGER 480V (or 240V)", or with other voltage designations. Letters shall be at least 2" high.

2.11 WIRING DEVICES

- A. All wiring devices shall be specification grade and shall meet NEMA WD1-1971 requirements. Furnish types of wiring devices as follows:

1. 2P/3W grounding, 20A/125V, NEMA 6-20R; Single receptacle: Hubbell #5361, Arrow Hart #5361, or equal.
2. GFCI receptacle shall be Square D "GFSR-115-B" with NEMA 5-15R style receptacle or "GFSR-120-B" with NEMA 6-20R style receptacle. GFCI receptacle shall be in duplex configuration; that is, top half shall contain test and reset button and bottom half shall contain protected receptacle.
3. Single-pole, single-throw 20A tumbler switch: Hubbell #1223, Arrow Hart #1992, or equal.
4. Single-pole, double-throw (three-way) 20A tumbler switch: Hubbell #1224, Arrow Hart #1993, or equal.
5. Double-pole, double-throw (four-way) 20A tumbler switch: Hubbell #1224, Arrow Hart #1994, or equal.
6. Double-pole, single-throw 20A, tumbler switch: Hubbell #1222, Arrow Hart #1992 or equal.
7. Single-pole, single-throw, momentary center - off 20A tumbler switch: Hubbell #1556, Arrow Hart #1995, or equal.
8. Manual motor starters shall be furnished complete with overloads and shall be Square D Type KO-Z, Westinghouse MS-TO1, or equal.
9. Furnish other types of wiring devices as may be indicated and specified on the drawings.

2.12 MISCELLANEOUS MATERIAL

- A. Empty raceway pullcords shall be glass fiber reinforced tape that is foot-marked along its length, Thomas "True Tape", Greenlee "Foot-Marked", or equal.
- B. Conduit thread compound for use with joining dissimilar metals and aluminum threads shall be conductive, non-galling, and corrosion inhibiting lithium-based compound.
- C. Cable pulling compound shall be non-injurious to raceways, conductors, and insulation. Compound shall be non-toxic, non-hardening type.

- D. Ground rods shall be copper-clad steel in lengths and diameters as indicated and shall be Blackburn, Hubbard, or equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Except where specifically noted or shown, the locations and elevations of equipment are approximate and are subject to small revisions as may prove necessary or desirable at the time the work is installed. Final locations shall be confirmed with the Engineer in advance of construction.
- B. Where equipment is being furnished under another Section, request from the Engineer accepted drawings that will show exact dimensions of required locations of connections. Install the required facilities to the exact requirements of the accepted drawings.
- C. All work shall be done in the best and most workmanlike manner by qualified, careful electricians who are skilled in their trade. The standards of work required throughout shall be of the first class only and electricians whose work is unsatisfactory to the Engineer shall be instantly dismissed from the work upon written notice from the Engineer. All work must meet the approval of the Engineer.
- D. Unless shown in detail, the Drawings are diagrammatic and do not give exact details as to elevations and routing of conduits, nor do they show all offsets and fittings; nevertheless, install the conduit system to conform to the structural and mechanical conditions of the construction. Unless locations and routing of exposed conduits are shown, confirm locations and routing prior to installation with the Engineer.
- E. Holes for raceway penetration into sheet metal cabinets and boxes shall be accurately made with a hole punch. Cutting openings with a torch or other device that produces a jagged, rough-cut will not be acceptable.
- F. Cabling inside equipment shall be carefully routed, trained and laced. Cables so placed that they obstruct equipment devices will not be acceptable.
- G. Equipment shall be set level and plumb. Supporting devices installed shall be set and so braced that equipment is held in a rigid, tight fitting manner.
- H. The Contractor shall verify the electrical capacities of all motors and electrical equipment furnished under other Sections, or furnished by the Owner, and request wiring information from the Engineer if wiring requirements are different from that specified under this Section. Do not make rough-ins until equipment verifications have been received.
- I. The Contractor shall install all controllers, instruments, Distributed Control System Equipment (if specified), terminal boxes, pilot devices, and miscellaneous items of electrical equipment that are not integrally mounted with the equipment furnished under other Sections. All such equipment shall be securely mounted and adequately supported in a neat and workmanlike manner.

3.02 EXCAVATION AND BACKFILLING

- A. All excavating and backfilling necessary for the installation of the work shall be performed as detailed in Division 02. This shall include shoring and pumping in ditches to keep them dry until the work in question has been installed. All shoring required to protect the excavation and safeguard employees shall be properly performed.
- B. All excavations shall be made to the proper depth, with allowances made for floors, slabs, forms, beams, piping, finished grades, etc. Ground under conduits shall be well compacted before conduits are installed.
- C. All backfilling shall be made with selected soil, free of rocks and debris and shall be tamped as required to prevent settlement.
- D. All excavated material not suitable and not used in the backfill shall be removed to the on-site disposal area. Area shall be as directed by the Engineer.
- E. Field check and verify the locations of all underground utilities prior to any excavating. Avoid disturbing these as far as possible. In the event existing utilities are broken into or damaged, they shall be repaired so as to make their operation equal to that before the trenching was started.
- F. Where the excavation required the opening of existing walks, drives, or other existing pavement, these facilities shall be cut as required to install new lines and to make connections to existing lines. The sizes of the cut shall be held to minimum consistent with the work to be installed. After installation of new work is completed and the excavation has been backfilled in accordance with above, repair existing walks, drives or other existing pavement to match existing installation.

3.03 CUTTING AND PATCHING

- A. Cutting and patching required under this section shall be done in a neat workmanlike manner. Cutting lines shall be uniform and smooth.
- B. Use concrete saws for large cuts in concrete and use core drills for small round cuts in concrete.
- C. Where openings are cut through masonry walls, provide lintel or other structural supports to protect the remaining masonry. Adequate support shall be provided during the cutting operations to prevent damage to masonry.
- D. Where large openings are cut through metal surfaces, attach metal angles around the opening.
- E. Patch concrete openings that are to be filled with non-shrinking cementing compound. Finished concrete patching shall be troweled smooth and shall be uniform with surrounding surfaces.

3.04 WATERPROOFING

- A. Provide waterproof flashing for each penetration of exterior walls and roofs.

- B. Flashing for conduit penetrations through built-up roofs shall be made with pitch pans filled full with pitch. Conduit penetrations through poured concrete roofs shall be made with sleeves and annulus caulked.
- C. Penetrations through walls at below ground elevations shall be waterproofed by conduit sealing fittings or other methods as indicated. This includes all conduit that is located and/or terminated in areas that can transport sewer gases from raw sewage to control panels and other equipment. All local control panels, control stations and motors shall have conduit sealing fittings installed.
- D. Interiors of raceways that are likely to have water ingress such as runs from handholes into below-grade installations shall have water stops installed to prevent water from entering into installations.

3.05 PROTECTION

- A. The Contractor shall provide suitable protection for all equipment, work and property against damage during construction.
- B. The Contractor shall assume full responsibility for material and equipment stored at the site.
- C. Conduit openings shall be closed with caps during installation. All outlet boxes and cabinets shall be kept free of concrete, plaster, dirt and debris.
- D. Equipment shall be covered and tightly sealed against entrance of water, dust, dirt and debris.
- E. All dry transformers prior to energization shall be protected against moisture and dirt absorption by a suitable covering. Also, maintain heat inside the covering by suitable means to prevent condensation.
- F. Interiors of electrical equipment shall be kept clean and dry prior to energization.

3.06 DUCT LINES AND PULL BOXES

- A. The Contractor shall excavate, backfill, remove excess soil, and furnish material for and install duct lines wherever shown on the plans. Conduit encased in concrete shall have three inch minimum covering of concrete on outside walls of ducts bank, and one inch minimum of concrete between the outside walls of adjacent conduits. The top of the ducts shall in general be 1'-6" below ground unless specifically shown otherwise on the drawings or is required to be deeper by N.E.C. or other codes.
- B. It shall be the electrical subcontractor's responsibility to determine in advance any conflicts of duct banks with underground obstructions of electrical or any other disciplines and report these anticipated conflicts to the Engineer well in advance of operations such that the conflicts can be easily and economically resolved by all parties.
- C. Conduit shall be firmly secured by driving reinforcing rod 12" in ground and tying with No. 10 wire.
- D. Where excavation has been made to a greater depth than that required, backfill shall be tamped solid and level to the required depth. All concrete forms shall be removed after the concrete has set, and all trenches shall be backfilled and tamped.

- E. Pull boxes shall be installed as shown on the plans.

3.07 RACEWAY INSTALLATION

- A. Install the raceway system to provide the facility with the utmost degree of reliability and maintenance-free operation. The raceway system shall have the appearance of having been installed by competent workmen. Kinked conduit, conduit inadequately supported or carelessly installed do not give such reliability and maintenance-free operation and will not be accepted.
- B. Raceway shall be installed for all wiring runs except as otherwise indicated.
- C. Exposed raceways shall be installed with their lines parallel to the lines of the building or structure to which they are attached.
- D. Conduit runs that enter bottom of floor mounted enclosures that are open on the bottom shall be each equipped with grounding bushing on each conduit.
- E. Conduit entries into sheet metal enclosures located inside shall be made with double locknuts and capped with molded Bakelite grounding type bushings. Threaded penetration shall expose enough threads to adequately thread on bushing.
- F. Conduit entries into NEMA 3, 3R, 4 or 12 enclosures located outside and in wet or damp location inside, shall be made with field-applied watertight hubs. Install locknut inside and cap each conduit with grounding bushing.
- G. Conduit runs into boxes, cabinets, and the like shall be set in a neat manner. Vertical runs shall be set plumb. Conduits set crooked or out-of-plumb shall be replaced.
- H. Conduits entrances into enclosures shall be carefully planned. Cutting away of enclosure structure, torching and/or cutting away sills, braces and structural members of the enclosure will not be acceptable.
- I. Use approved hole cutting tools for entrances into sheet metal enclosures. Use of cutting torch or incorrect tools will not be acceptable. Holes shall be carefully planned and then cleanly cut and they shall be free from burrs, jagged edges, and torn metal.
- J. Make-up of some conduit runs will require union fittings or split couplings. Install such fittings where required.
- K. Liquidtight conduit shall be used for connections to motors, solenoids, pressure switches, limit switches, unit heaters, fans, motorized louvers, and other devices that may need to be removed for servicing. Each run of liquidtight flex shall be joined with liquidtight flex connectors. Make up each connection tightly; finished connector shall have minimum of 100 pounds pull-out resistance.
- L. Empty conduits shall have pull tape installed the length of each run. Identify each terminal as to location of other end. Use blank waterproof label with waterproof ink. Cap exposed open ends of empty conduits.

- M. Conduit bodies shall be installed in exposed runs of conduit where indicated and also wherever required to overcome obstructions and to provide access to wires. Covers for such fittings shall be accessible and unobstructed by the adjacent construction.
- N. All raceway systems shall be adequately and safely supported. Loose, sloppy and inadequately supported raceways will not be acceptable and shall be replaced. Supports shall be installed at intervals not greater than those set forth under Article 300 of N.E.C. unless shorter intervals are otherwise indicated; or, unless conditions require shorter intervals of supports.

3.08 WIRING INSTALLATION

- A. Conductors for power and control wiring shall be sized as indicated and where no size is given, the conductor size shall be #12 AWG.
- B. Color of power wire insulation and color of phase indicating tape shall be as follows:

<u>Conductor</u>	<u>Wire Color</u>	<u>Tape Color</u>
Phase A	Black or Red	Red
Phase B	Black or Red	Yellow
Phase C	Black or Red	Blue
Neutral	White	-
Equipment Ground	Green	-

- C. All wiring shall be installed in raceways, except as otherwise specified. No wire or cable shall be drawn into a raceway until the raceway run has been completed, swabbed, and outfitted with specified bushings and fitments.
- D. Do not exceed wire and cable manufacturer's recommended pulling tensions. Cable pulling compound shall be used as a lubricant for difficult pulls.
- E. Carefully handle wire and cable, do not kink, scrape or damage conductors or their insulation.
- F. Feeder and branch circuit wiring shall be installed from supply to load without splice, unless otherwise indicated. Branch circuits may be spliced for receptacle, lighting, and small appliance load inside appropriate junction boxes, and inside lighting fixtures.
- G. Except as otherwise specified, taps and splices with #10 AWG, and smaller shall be made with insulated spring-wire connectors. Such connectors in damp or wet locations shall have opening in wire nut filled with silicone rubber cement and then wrapped with a layer of EPR tape or spring wire connectors manufactured for this use shall be used.
- H. Motor connections made with #10 AWG and smaller wire shall be made up with set-screw copper lugs and with threaded-on set-screw copper lugs and with threaded-on insulating jacket. Where motors are located in damp or wet locations, fill opening under jacket with silicone rubber and cover connector with a layer of EPR tape.

- I. Taps and splices in #8 AWG and larger wires shall be made up with copper alloy connectors. Apply over each connector a bedding of insulation putty. Then, apply at least four layers, half-lapped each layer of EPR tape. Finally, apply at least four layers half-lapped each layer of electrical tape.
- J. Each wiring connection shall be made up tightly so that resistance of connection is as low as one-foot length of associated largest conductor resistance.
- K. Numbered marking labels shall be installed to identify circuit numbers from panelboards and to identify control wiring. Install labels on each wire in each panelboard, junction, and pullbox, and device connection. See "Identifying and Tagging" sections of these specifications.
- L. Install numbered marking labels on each control wire termination at each terminal strip. Number selected shall correspond to manufacturer's terminal numbers.
- M. Where control wiring terminates onto flat head type terminals, equip each such wire with crimp-type locking spade connector.
- N. All wiring inside enclosure shall be neatly trained and laced. Bundle wires into groups and lace with plastic tie-wraps.
- O. Install "DANGER 480V (or 240V)" labels on motor control equipment, and on other enclosures such as safety switches, wire-ways, and large enclosures that contain 480V (or 240V) wiring.
- P. Install wiring devices where indicated. Each wiring device shall be set with axes plumb and installed with its yoke screws so as to adequately support device and provide grounding means to box. Where ganged devices are shown, install them into ganged boxes.
- Q. Each item of equipment shall be adequately and thoroughly grounded. Comply with Article 250 of N.E.C.
- R. Equipment grounding conductors into equipment shall be grounded to equipment ground bus or ground lug. Where no ground lugs are provided install ground lug and bond EGC thereto.
- S. Where grounding bushings are installed, bond EGC there to end and furthermore ground each bushing lug to equipment ground bus or ground lug.

3.09 GROUNDING SYSTEM

- A. The Contractor shall furnish and install a complete grounding system as shown on the Drawings consisting primarily of bare copper conductor and copper clad steel ground rods. All electrical equipment shall be tied to this system either with cable shown or the metallic conduit system per N.E.C. Attach grounding system to metallic buildings as required by N.E.C. weather specifically shown on drawings or not.

3.10 MANUFACTURING OF ELECTRIC CONTROL PANELS

- A. All electrical control panels including unit motor starters shall be factory assembled. In no case shall the electrician assemble and wire internal components in the field. The only onsite wiring

that will be allowed inside panels is connections of external wiring to factory installed terminal strips.

3.11 NAMEPLATES

- A. The electrical subcontractor shall install nameplates on all electrical equipment and devices including remote operating stations that clearly identifies the device. Nameplates shall be sized appropriately for the device and shall be attached with stainless steel screws or double sided tape suitable for outdoor use, 3M Scotch Brand Very High Bond 4930 or equal. Tape shall cover the entire surface of the nameplate.
- B. A nameplate schedule indicating proposed wording and sizes shall be submitted to the Engineer for approval.

3.12 OVERLOAD HEATERS

- A. The Contractor shall submit to the Engineer a form entitled "Motor Overload Heaters and Circuit Breaker Data Sheet" which shall contain actual nameplate information on the motors and motor starters which he shall inspect and record. He shall use the appropriate charts and tables supplied with the starting equipment and select, for approval by the Engineer, the manufacturer's recommended overload heaters and circuit breaker settings. Along with the data sheet he shall also submit a copy of the manufacturer's charts and tables. Motors shall not be started until overload heaters and circuit breaker settings are approved by the Engineer.

3.13 CLEAN-UP

- A. Remove all temporary labels, dirt, paint, grease and stains from all exposed equipment. Upon completion of work clean equipment and the entire installation so as to present a first class job suitable for occupancy. No loose parts or scraps of equipment shall be left on the premises.
- B. Equipment paint scars shall be repaired with paint kits supplied by the equipment manufacturer, or with an approved paint.
- C. Clean interiors of each item of electrical equipment. At completion of work all equipment interior shall be free from dust.

3.14 TESTS

- A. Each run of power and control wiring shall be tested prior to connection of line and load. Make tests with 1000V dc hand-crank megger. Each run of wiring shall be tested phase-to-phase and/or phase-to-neutral, and phase-to-ground. Test results for each test shall be equal to or greater than 100 megohms with 1000V dc applied. Defective wiring shall be replaced and retested. All tests shall be made in the presence of the Engineer.
- B. High voltage cables, where used, shall be Hi-Pot tested in accordance with test procedures as outlined in other sections of these specifications or as directed.

- C. All equipment shall be put through a trial run-in test to ascertain the performance complies with the intent of the specifications. All run-in tests shall be made in the presence of the Engineer.

END OF THIS SECTION

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**TECHNICAL PROVISIONS
SECTION 825
DETAIL SPECIFICATIONS FOR ELECTRICAL INSTALLATION**

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TECHNICAL PROVISIONS
SECTION 825
DETAIL SPECIFICATIONS FOR ELECTRICAL INSTALLATION

PART 1 - GENERAL

1.01 SCOPE

- A. The work covered by this section shall include furnishing and/or installation of all electrical and instrumentation equipment and necessary wiring systems required to provide the Owner with a complete and operating system and shall consist of the following basic items of work:
1. Service Meters
 2. Main Circuit Breakers (MB)
 3. Automatic Transfer Switch (ATS)
 4. Generator
 5. Panelboards
 6. Surge Protection Devices (SPD)
 7. Variable Frequency Drives (VFD)
 8. Dry Transformers
 9. Control Panels
 10. Level and Pressure Transmitters
 11. Magnetic Flow Meters
 12. SCADA Panels
 13. Luminaires
 14. Conduit
 15. Low Voltage Wire
 16. Junction Boxes
 17. Grounding System
 18. Mounting Racks and Materials
 19. Circuit breakers, fuses, other equipment, and work as shown on the Drawings and as required for a complete and working installation.
- B. All demolition and installations shall be in accordance with the Contract documents.
- C. All electrical work shall be in accordance with the latest edition of the National Electrical Code.
- D. All material and equipment shall comply with Local and State electrical codes, the latest requirements of the National Electrical Code, OSHA, and the applicable standards of the NEMA, UL, ASTM, IEEE, ANSI, ICEA.

1.02 CONTROL PANELS

- A. Panels shall enclose and be wired for all motor branch components, circuit breakers, switches, pilot lights, relays, and other AC and DC control components as shown on diagrams and as required to perform functions as described in this and other sections of the specifications.

Terminal strips shall be provided for connection of all external wiring. All electrical devices shall be finger safe or have finger safe covers to prevent incidental contact with energized components while troubleshooting an energized panel.

- B. Terminal strips shall be heavy-duty types with barriers between points. Nameplates shall have white letters on black laminated phenolic plastic background glued to enclosure. Each enclosure, including RTU enclosures (if used) shall be protected with Hoffman or equal corrosion inhibitors. Control equipment shall be 22 or 30mm Allen Bradley, Cutler Hammer, ACI or equal as follows:
 - 1. Push Buttons – Flush Button, Momentary Contact
 - 2. Selector Switches – Standard Operator, Maintained Contact
 - 3. Toggle Switches – Maintained Contact
 - 4. Pilot Lights – Direct or Transformer Type Push to Test or LED
- C. Each panel shall be furnished with the following spare parts. Deliver spare parts to Owner, have Owner sign for them and supply copy of document to the Engineer.
 - 1. Two (2) of each size control and power fuses
 - 2. Six (6) of each size indication lights

PART 2 - PRODUCTS

2.01 SERVICE METER

- A. Contractor shall furnish and install the service meter and current transformer equipment as shown on the Drawings.
- B. Metering equipment shall comply with power company's requirements.

2.02 MAIN CIRCUIT BREAKER (MB)

- A. The Contractor shall furnish and install a main circuit breaker as shown on the Drawings and as follows:
 - 1. Current – 1,000 A trip with 1,200 a frame
 - 2. Voltage – nominal system voltage
 - 3. Type – Molded-Case circuit breaker with electronic trip unit (LSIG)
 - 4. AIC – 65,000 amps minimum
 - 5. Enclosure – NEMA 3R for outdoor installation with provision for padlocking
 - 6. Furnished with equipment grounding and neutral lugs
 - 7. Main breakers shall be as manufactured by Eaton or approved equal.

2.03 AUTOMATIC TRANSFER SWITCH (ATS)

- A. Contractor shall furnish and install an automatic transfer switch as shown on the Drawings.
- B. Contractor shall refer to Section 826 of the Specifications for additional information.

2.04 GENERATOR

- A. Contractor shall furnish and install a generator as shown on the Drawings.
- B. Contractor shall refer to Section 826 of the Specifications for additional information.

2.05 PANELBOARDS

- A. The Contractor shall furnish and install panelboards as shown on the Drawings.
- B. Enclosure NEMA rating shall be as indicated on the Drawings.
- C. Panelboards shall be as manufactured by Eaton, Square D or approved equal.

2.06 SURGE PROTECTION DEVICE (SPD)

- A. Contractor shall furnish and install Surge Protection Devices (SPDs) as shown on the Drawings.
- B. Service SPD
 - 1. Voltage - 480V (3W+G)
 - 2. Surge current capacity (per phase) – 250kA
 - 3. Nominal discharge current (I_n) - 20kA
 - 4. Short circuit current rating (SCCR) - 200kA
 - 5. Enclosure - NEMA 1
 - 6. Display - real-time LED protection status indicators, surge counter
 - 7. Listings - UL 1449 current edition listed, Type 2 for use in UL 96A systems
 - 8. Warranty – 10 years
 - 9. Manufacturer – Eaton SPD Series Sidemount Units, or approved equal.
- C. Single Phase SPD
 - 1. Voltage - 120/240V (3W)
 - 2. Surge current capacity (per phase) – 36kA
 - 3. Nominal discharge current (I_n) - 10kA
 - 4. Short circuit current rating (SCCR) - 25kA
 - 5. Enclosure - NEMA 4X
 - 6. Display - real-time LED protection status indicators
 - 7. Listings - UL 1449 current edition listed, Type 1
 - 8. Warranty – 18 months
 - 9. Manufacturer – Square D SDSA 1175, or approved equal.

2.07 VARIABLE FREQUENCY DRIVES (VFDs)

- A. The Contractor shall furnish and install variable frequency drive controllers as shown on Drawings.
- B. VFD's shall be rated for the horsepower and the full load current of the motors that they will be serving.
- C. VFD's shall be in NEMA 12 enclosures.
- D. VFD's shall have a "sleep mode" to minimize pump wear in low flow situations.
- E. VFD's shall receive 4-20mA signal representing discharge pressure from the discharge pressure transmitter dedicated to the individual VFD and shall be programmed to maintain setpoint pressure. The VFD will receive start/stop contacts from the MCP.
- F. VFD's shall be provided with a 6 year on site parts and labor warranty.
- G. VFD's shall be Danfoss VLT Aquadrive, or approved equal.

- H. Provide the VFD's manufacturers service representative at the job site to program and set the drives for proper operation. Provide a certification document signed by the manufacturer's representative.

2.08 DRY-TYPE DISTRIBUTION TRANSFORMERS

- A. The Contractor shall furnish and install a general purpose individually mounted ventilated dry-type transformer as specified herein and as shown on the Drawings.
- B. The transformer phase, KVA and voltage ratings shall be as indicated on the Drawings.
- C. Insulation shall be 220° C with 115° C rise over 40° C ambient and 30° C hot spot.
- D. Transformer shall be provided with a minimum of two 2½% ANFC and two 2½% BNFC primary taps.
- E. The enclosure shall be a NEMA 1 rating and made of heavy-gauge steel. All transformers shall be equipped with a wiring compartment suitable for conduit entry and large enough to allow convenient wiring. The core of the transformer shall be grounded to the enclosure.
- F. Transformer shall be as manufactured by Eaton, Square D or approved equal.

2.09 MAIN CONTROL PANEL

- A. The Contractor shall furnish and install the Main Control Panel as shown on the Drawings. The MCP shall come prewired for all required external connections. These specifications indicate function and control. Provide all parts, equipment and wiring necessary to provide the Owner with a complete and properly operating system.
- B. Main Control Panel operation shall be as follows:
 - 1. The MCP shall receive a 4-20mA signal representing ground storage tank level from the PTP. The GST set point controller in the MCP shall be used to provide the Control Valve open/close set points. The GST set point controller shall also provide low level lockout for the Booster Pumps.
 - 2. MCP shall include a time of day clock to limit opening of the Control Valve to adjustable time of day. GST set point controller shall be programmed with a "Lag" set point upon which the Control Valve shall be opened regardless of time of day clock setting.
 - 3. The MCP shall receive a 4-20mA representing local discharge pressure from the PTP. The discharge pressure set point controller in the MCP shall be used to provide the booster pump lead, lag, lag2, lag3, and off set points. Booster pumps shall alternate starts.
 - 4. The MCP shall receive a 4-20mA from SCADA signal representing elevated tank level. The EWT level set point controller in the MCP shall be used to provide the booster pump lead, lag, lag2, lag3, and off set points. Booster pumps shall alternate starts.
 - 5. MCP shall include a selector switch for selection of control based on Local Discharge Pressure or Elevated Tank Level. When the switch is on Local, the contacts from the discharge pressure setpoint controller shall be used to start/stop the booster pumps. When the switch is on EWT, the contacts from the elevated tank level setpoint controller shall be used to start/stop the booster pumps.
 - 6. The MCP shall connect to the SCADA panel as shown on the Drawings.
 - 7. MCP shall include a timer to force alternation of the booster pumps after an adjustable duration of pump run time.

8. Booster pumps shall be prevented from running when low level is reached in the ground storage tank.
- C. Panel shall consist of the following minimum components:
1. Enclosure: NEMA 12 fiberglass enclosure. Mount all controls and indicators on front of panel
 2. Main circuit breaker
 3. SPD
 4. Controller for booster pump H-O-A function, out of rotation, and alternation, Control Systems, Inc. QC101B Quadraplex Controller, or prior-approved equal.
 5. Power supply
 6. Set point controllers: electronic, solid state, proportional level meters/controllers, Control Systems, Inc. MPCT6B Multipoint Current Trip, or prior-approved equal
 7. Elapsed time meters for each motor
 8. Analog isolators
 9. Switches as shown on the Drawings
 10. Indicator lights as shown on the Drawings
 11. Auxiliary contacts as shown on the Drawings
 12. Auxiliary relays
 13. Finger safe terminals for connection of all external devices. Only one external wire will be allowed in each terminal
 14. Time delays to prevent simultaneous starting of motors
 15. Corrosion inhibitor
- D. Provide one fully programmed spare controller for each controller that is furnished in the MCP.
- E. MCP shall be manufactured by Control Systems, Inc., Jackson, MS, or prior-approved equal.

2.10 PRESSURE TRANSMITTER PANEL (PTP)

- A. The Contractor shall furnish and install the Pressure Transmitter Panel (PTP) as specified herein and as shown on the Drawings.
- B. Panel shall include:
1. NEMA 12 fiberglass enclosure
 2. Pressure transmitters shall be Rosemount 2088, ABB PGS100, or approved equal. Quantity as shown on the Drawings.
 3. Pressure transmitters shall be provided with a digital display and block and bleed valves.
 4. Pressure transmitters shall have HART digital communication and 4-20mA output.
 5. Surge protection for each 4-20mA analog signal.
 6. Terminals for connection of all external wiring, Phoenix Contact 6mm or approved equal.
 7. Nameplates.

2.11 MAGNETIC FLOW METERS

- A. Contractor shall furnish and install Magnetic Flow Meters as shown on the Drawings.
- B. Meter shall have a polyurethane liner, 316 stainless steel bullet-nose electrodes, and carbon steel Class 150 flanges.

- C. Flow meter transmitters shall have HART digital communication and 4-20mA output.
- D. Flow meter transmitter shall be remote mounted. Flow meter junction box shall be potted at the factory.
- E. Furnish and install grounding rings for each meter provided.
- F. Flow meter shall be Rosemount 8750W Utility Magnetic Flow Meter, ABB WaterMaster, or approved equal.

2.12 MAGNETIC FLOW METER SURGE PROTECTOR

- A. The Contractor shall furnish and install a surge protector ahead of magnetic flow meter transmitters to protect the flow meter from voltage surges in the incoming power. Surge protectors shall be Total Protection Solutions Load Track LT-15A, or approved equal. Surge protectors shall be mounted inside a single NEMA 4X fiberglass hinged door enclosure.

2.13 SCADA

- A. The Contractor shall furnish and install a SCADA system as specified herein and as indicated on the Drawings.
- B. SCADA system shall consist of a web to wireless remote monitoring panel that sends/receives cellular monitoring signals to/from the cloud. SCADA system shall include the RTU/monitoring panel and software/access as required for the Owner to log onto a private, secure web page to view status, send remote control commands, configure and acknowledge alarms, etc. SCADA software shall be VT SCADA, or approved equal.
- C. RTU/monitoring panel shall consist of the following minimum components:
 - 1. NEMA 4X fiberglass enclosure
 - 2. Main circuit breaker
 - 3. SPD
 - 4. Power supply
 - 5. DC UPS with a minimum of 30 minutes of DC power backup
 - 6. Cellular antenna
 - 7. I/O as shown on the Drawings
- D. Operation
 - 1. Phase 1 operation shall consist of monitoring the inputs and operator initiated forcing start/stop of the booster pumps as shown on the Drawings.
 - 2. Phase 2 will consist of expanding the Lacassine Site to include wells and filters. SCADA RTU/monitoring panel shall be connected to the Phase 2 Filter Control Panel Ethernet switch for communication via Ethernet/IP protocol.
 - 3. In a future phase, an RTU/monitoring panel will be installed at the Owner's existing water treatment plant in Thornwell. Once that panel has been added, the SCADA system shall provide a 4-20mA output representing Thornwell elevated tank level to the Lacassine MCP as shown on the Drawings.
- E. SCADA RTU/monitoring panel shall be manufactured by Control Systems, Inc., Jackson, MS, or prior-approved equal.

2.14 LUMINAIRES

- A. The Contractor shall furnish and install luminaires as indicated on the Drawings. Luminaires shall include the following:
- B. Type A - 4 ft. industrial suspended/surface mounting
- | | |
|----------------------|---|
| 1. Voltage | 120V |
| 2. Lamp | LED |
| 3. Lumens | 5,300 |
| 4. Color temperature | 4000K |
| 5. Manufacturer | H.E. Williams 80-4-L53/840, or approved equal |
- C. Type AE - 4 ft. industrial suspended/surface mounting
- | | |
|-----------------------------|--|
| 1. Voltage | 120V |
| 2. Lamp | LED |
| 3. Lumens | 5,300 |
| 4. Color temperature | 4000K |
| 5. Emergency battery backup | Yes |
| 6. Manufacturer | H.E. Williams 80-4-L53/840 EM/10W, or approved equal |
- D. Type B – wall pack
- | | |
|----------------------|---|
| 1. Voltage | 120V |
| 2. Lamp | LED |
| 3. Lumens | 2,600 |
| 4. Color temperature | 5000K |
| 5. Housing | Die-cast aluminum |
| 6. Lens | Impact resistant prismatic borosilicate glass refractor |
| 7. Finish | Bronze |
| 8. Listings | UL Wet Location |
| 9. Manufacturer | H.E. Williams WPS2-L26/850, or approved equal |
- E. Type D – area light w/aluminum arm
- | | |
|----------------------|------------------------------------|
| 1. Voltage | 120V |
| 2. Lamp | LED |
| 3. Lumens | 4,200 |
| 4. Color temperature | 5000K |
| 5. Lens distribution | Type V |
| 6. Housing | Die-cast aluminum |
| 7. Lens | Prismatic acrylic refractor |
| 8. Accessories | Photocell |
| 9. Listings | UL Wet Location |
| 10. Manufacturer | Hubbell DDL-9LU, or approved equal |

2.15 CONDUIT

- A. The Contractor shall furnish and install all conduit as shown on the Drawings and as required. All conduit on this project shall be of the following types:
 - 1. Exposed Conduit Runs – shall be schedule 40 rigid aluminum.
 - 2. Underground conduit – U.L. Listed Schedule 40 PVC buried 2'-0". Underground stub up elbows shall be schedule 80 PVC. Install electrical warning tape 12" above conduit.
 - 3. Inside building – not subject to physical damage for general lighting and receptacles, EMT may be used. EMT shall not be used to support luminaires or other equipment.
 - 4. Service lateral conduit shall be installed in accordance with the power company's requirements.
 - 5. All metallic outlet boxes shall be cast aluminum.
 - 6. Minimum conduit size shall be ¾" unless noted otherwise.
 - 7. Utilize Meyers hubs where conduit enters outdoor panels.

2.16 LOW VOLTAGE WIRE

- A. The Contractor shall furnish and install all 600 Volt wire as shown on the Drawings and as field required. Wire is specified in the General Specifications for Electrical Installation.
- B. Acceptable manufacturers shall be Southwire, Houston Wire, Okonite, or approved equal.

2.17 JUNCTION BOXES

- A. The Contractor shall furnish and install junction boxes as shown on the Drawings and as required within the raceway system for proper installation of the conductors called for on the Drawings.
- B. All boxes shall be sized in accordance with National Electric Code requirements and shall be UL listed.
- C. Junction boxes shall be NEMA 4X stainless steel unless noted otherwise.
- D. The Contractor shall furnish and install junction boxes for each utility service entrance as shown on the Drawings. Junction boxes for utility service entrances shall be as follows:
 - 1. Junction box shall be in strict conformance with the current power company requirements. Minimum dimensions shall be 12"x24"x24".
 - 2. Junction box shall be NEMA 3R painted steel with front cover that is hinged to the side.
 - 3. Junction box shall have provisions for a padlock to lock it in the closed position.
 - 4. Contractor shall furnish UL listed connectors inside the junction box. Connectors shall be suitable for both copper and aluminum. Insulated multi connector block or buss bar type shall be used. Buss bar or bare multi connector block types shall be fastened properly to the back of the junction box. Insulated multi connector block type shall not be fastened.
 - 5. A durable marking for color shall be installed. The neutral conductor shall have a white marking. The next section of the terminals shall have color suitable for the applicable voltage.

2.18 HAND-HOLE

- A. The Contractor shall furnish and install hand-holes as shown on the Drawings and as follows:
 - 1. Hand-holes shall be UL listed polymer concrete with cover marked "electric"

2. Minimum size shall be 24"x24"x24"
 3. Hand-hole shall be Armorcast, or approved equal.
- B. Contractor shall furnish and install 6" to 8" bed of pea gravel or crushed stone for drainage. Install 12" wide x 8" deep concrete perimeter collar. Complete installation shall be in accordance with the manufacturer's instructions.
- C. For conductor connections inside the hand-hole, Contractor shall furnish and install multi-port splice connectors, UL listed for direct submersible wet location. Connectors shall be Polaris, or approved equal.

2.19 GROUNDING SYSTEM

- A. Grounding system shall be in accordance with latest edition of the NEC and as called for on the Drawings.

2.20 MOUNTING RACKS AND MATERIALS

- A. The Contractor shall construct all equipment and mounting racks, including conduit support racks, as shown on the plans, and as required for a complete and properly operating installation. Additionally, furnish and install at the switchrack a 15A, 125volt, GFCI general use receptacle in a weatherproof enclosure and cover.

PART 3 - EXECUTION

3.01 SCHEDULING WORK

- A. The Contractor shall schedule the electrical work such that a minimum amount of down time is required during the placing of the electrical system in operation.

3.02 DEMOLITION

- A. The Contractor shall disconnect and remove all existing electrical and instrumentation equipment that is not to remain in service at the completion of this project and which is located in buildings or areas to be renovated. Verify that the equipment is not being used and not going to be used. All removed equipment shall be turned over to the Owner for selection of items that he wishes to keep in stores. All other items shall be properly disposed of by the Contractor.

3.03 COORDINATION WITH FACTORY SERVICEMEN

- A. The Contractor shall coordinate his work with the factory serviceman of the various vendors and shall provide whatever assistance is necessary to place the entire system in operation.

3.04 COORDINATION WITH THE POWER COMPANY

- A. All work on the service entrance from weather head or pad mounted transformer to utilization equipment shall be per local power company requirements. Where there is conflict with plans and specifications with the power company requirements, the power company requirements shall govern. The Contractor shall notify the engineer in advance of making a change for the Engineer's approval. In some instances, larger wire and conduit sizes may be required. The Contractor shall anticipate this requirement and include it in the bid price.

- B. The Contractor shall coordinate all work with the local power company including scheduling and applying for service, furnishing, and/or installing all metering equipment and installing all service entrance weather heads at elevation as required by power company and NEC.
- C. Seal all conduits entering panels with duct seal where it is possible that water or moisture can enter electrical equipment. Utilize weather heads for all overhead service wire entering conduit. Where service conduit is installed by power company, the contractor shall furnish a properly sized weather head to the power company to prevent water from entering any panel in which it terminates.

3.05 ELECTRICAL TECHNICIANS

- A. The Contractor shall employ and pay for electrical technicians as necessary to ensure proper installation, connection, testing, and placing into proper service electrical equipment. Utilize experienced personnel only. Coordinate all work with other vendor's technicians and service personnel.

3.06 GROUNDING

- A. The Contractor shall furnish and install a complete grounding system to provide a safe operating environment. Additional wires for grounding may be required in certain conduit runs. Install as required per NEC. Additional ground rods may also be required to obtain the minimum ground resistance required by NEC. Furnish and install as required to meet the requirements of NEC.

3.07 SUBMITTALS

- A. Submittal data shall include, but not be limited to the following requirements:
 - 1. Complete materials list and items proposed to be furnished and installed.
 - 2. Enclosure dimensions materials of construction and NEMA ratings.
 - 3. Circuit breaker and other equipment interrupting ratings.
 - 4. Switch horsepower rating.
 - 5. All electrical drawings so that the system can be checked for compatibility with other systems to which its interfaces.
- B. The vendors shall custom design their electrical equipment and panels to match these electrical requirements. This means that it is highly unlikely that the vendors standard panels and electrical equipment will be compatible with the requirements of this project. Shop drawings shall be submitted showing external wiring terminals and shall properly identify the devices to which they are to be interconnected. Shop drawings that are submitted without properly identifying the devices to be interconnected with as shown on the drawings or as indicated herein the specs will be rejected by the engineer.
- C. Submittals sent to engineer for processing that require information on equipment that has not been previously submitted for approval may or may not be reviewed before dependent submittals are sent.
- D. Each item of the submittal shall be marked as to the specification section and article and/or its use.
- E. Any submittals that are not complete, causes the engineer to ponder, or where it is obvious that no effort was made to properly prepare them for easy checking by the engineer will be rejected in their entirety.

- F. Submittals shall be prepared using normally acceptable standards of the industry using one line and three-line diagrams as well as elementary diagram schematics. Mark all cut sheets to identify the items of equipment. Shop drawings shall be prepared/checked by personnel with many years of experience.

3.08 SUBSTITUTIONS

- A. On any proposed substitute to the specified item, it shall be the responsibility of the Contractor to show proof to the Engineer, that the proposed substitute is equal to the specified item by making written evaluation comparisons on material, performance, workmanship, maintenance features, energy use, durability, appearance, and the effect on compatibility with the other elements of the system which the item will be used. All changes required in the wiring and other electrical modifications shall be the responsibility of the Contractor.

3.09 GUARANTEE

- A. All equipment shall be guaranteed against defects in material and workmanship for a period of one year from the date of Owner's final inspection and acceptance, except equipment specifically indicated in these specifications as having an extended warranty period, to the effect that any defective equipment shall be repaired or replaced without cost or obligation to the Owner.

3.10 OTHER PROVISIONS

- A. Where there are conflicts between various sections of the electrical specifications and/or drawings and/or other sections of the specifications, then the more stringent wording for a particular product, material, or item of work shall apply unless approved otherwise by the Engineer. Should a discrepancy occur, notify the Engineer before proceeding. The electrical drawings show the general locations of the equipment. The Contractor shall refer to the mechanical and civil drawings to obtain more accurate and the latest location of the equipment as well as to scale the drawings for distances. Equipment shown shall be mounted and placed so as not to violate any OSHA or NEC rules as to working space and obstruction clearance. Seal all conduits entering panels with duct seal where it is possible that water or moisture can enter the conduit due to its location or in case of damage to the conduit (use silicon where shown on Drawings or indicated in these specifications).

3.11 STARTUP

- A. The Contractor is responsible for "startup" of the proposed equipment and systems. Startup shall include any and all required programming, setpoints, testing, etc. as may be required to start up the equipment and systems and to satisfy the Operational Period requirements of the General Requirements.

3.12 LIST OF SUBMITTALS

- A. The following items shall be submitted for approval and /or records:
1. Service Meters
 2. Main Circuit Breakers (MB)
 3. Automatic Transfer Switch (ATS)
 4. Generator
 5. Panelboards
 6. Surge Protection Devices (SPD)

7. Variable Frequency Drives (VFD)
8. Dry Transformers
9. Disconnect Switches
10. Control Panels
11. Level and Pressure Transmitters
12. Magnetic Flow Meters
13. SCADA Panels
14. Luminaires
15. Conduit
16. Low Voltage Wire
17. Junction Boxes
18. Grounding System
19. Mounting Racks and Materials
20. Circuit breakers, fuses, other items that require electrical connection or as requested by the Engineer.

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**TECHNICAL PROVISIONS
SECTION 826
ELECTRICAL GENERATOR**

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**TECHNICAL PROVISIONS
SECTION 826
ELECTRICAL GENERATOR**

PART 1 - GENERAL

1.01 SCOPE

- A. The work covered by this section shall include furnishing, delivering, unloading, installing, and testing of an electric generator set, automatic transfer switch and accessories as required to provide the Owner with a complete and operating system.

1.02 SHOP DRAWINGS

- A. After receipt of the Notice of Award, the Contractor shall furnish the Engineer a PDF of shop drawings from the manufacturer detailing the equipment or products to be furnished including dimensional data and materials of construction. The Engineer shall promptly review this data and return to the Contractor as approved, approved as noted, or rejected. Upon receipt of accepted shop drawings, the manufacturer shall proceed with order entry of the products and/or fabrication of the equipment.

PART 2 - PRODUCTS

2.01 ELECTRIC GENERATING SET

- A. Scope: The Contractor shall furnish, deliver, and unload standby emergency generating system(s) rated for continuous standby service installed on a skid as described herein. Project maximum allowable voltage dip shall not exceed 20%. The system shall be a package of new and current equipment and shall consist of an electric plant complete with engine, generator, exhaust, and engine mounted radiator coolant system. The complete system shall be furnished by one supplier. Provide a factory document to verify instantaneous voltage dip. Sustained dip will not be acceptable. The required outputs are as stated. No exceptions or reduced outputs will be allowed. Approved manufacturers/vendors are approved by name only to submit a bid for the equipment. Approval does not imply that any information that may have been previously submitted is approved. Project specifications shall be met in their entirety. Unit(s) shall be rated as follows:

1. Quantity	One (1)
2. Frequency	60 Hz
3. Standby Rating	700 kW, 875 kVA @ 0.8 power factor
4. Voltage	277/480V, 3 phase, 4 wire
5. Fuel	Diesel
6. Coolant Heater	240V, 1 phase
7. Max. Hot Spot Temp. Rise	130°C @ 40°C ambient
8. Housing Sound Attenuation	75 db(A) log average at 23 ft. at no load
9. Housing Design Wind Speed	142 MPH

10. Manufacturer

Kohler, Cummins, or approved equal.

- B. General: The **engine-generator set supplier shall be an authorized service organization of the manufacturer. The generator supplier shall have his own and maintain a permanent parts and service facility. Service and parts shall be available on a twenty-four hour a day, seven days a week basis. The generator suppliers must meet this parts and service requirement and installation contractor shall submit certification and documentation with the submittal drawings to the satisfaction of the owner and engineer that this requirement is met.** The electric generator set and components shall be produced by a manufacturer who is regularly engaged in manufacturing this product. The manufacturer shall have printed literature & brochures describing the standard series offered (not a one-of-a-kind fabrication). The manufacturer shall furnish schematic & wiring diagrams for the engine/alternator sets. Sets not factory assembled, as a standard model with all controls, alternator, & engine tested together will not be acceptable. The manufacturer shall furnish (with submittals) a list of at least five successful installations in operation in the local area for a minimum of five years, with the same type & rating of equipment including the ATS. Provide the ratings if not the same as that specified. The performance test of the generating set series shall be in accordance with procedures certified by an independent testing laboratory. The manufacturer shall have successfully tested a prototype of the generating set series offered, per NFPA-110, which will include: Maximum power level, maximum motor starting capacity, structural soundness torsion graph analysis per MIL-STD-705B, method 504.2 fuel consumption, engine alternator temperature rise per NEMA MG1-22.40, single step load pick up, harmonic analysis and voltage waveform deviation per MIL-STD-705B, method 601.4, 3 phase short circuit test for mechanical and electrical strength.
- C. Engine: The engine shall be turbocharged, four cycle, water-cooled with mounted radiator, fan, and water pump. It shall have replaceable wet liners and an **engine and alternator operating speed of 1800 RPM**. Intake and exhaust valves shall be heat resisting alloy steel, free rotating. Exhaust valve seat inserts shall be provided. Full pressure lubrication shall be supplied by a positive displacement lube oil pump. The engine shall have air cleaner, fuel and oil filters with replaceable elements and lube oil cooler. Engine speed shall be governed by an electronic isochronous governor to maintain alternator frequency within 0.5% from no-load to full-load alternator output. The engine shall have a minimum 45 AMP battery charging DC alternator with a transistorized voltage regulator. Remote, 2 wire starting shall be by a solenoid shift electric starter. Governor to be electronic – isochronous.
- D. Engine Instruments: The engine instrument panel shall contain an oil pressure gauge, coolant temperature gauge, battery charge rate ammeter, engine monitoring system and on diesel fueled units, and an electronic fuel gage.
- E. Engine Controls: The generating set shall contain a complete engine start-stop control system which starts engine on closing contact and stops engine on opening contact. A cranking limiter shall be provided to open the starting circuit in approximately 45 to 90 seconds if the engine is not started within that time. The engine controls shall also include a 3-position selector switch with the following positions: RUN-STOP-REMOTE. The engine shall have the following additional equipment: safety shutdown system including low oil pressure, high engine temperature, low coolant level, over-speed, and over crank.
- F. Brushless Alternator: The alternator shall be a **PMG 4 pole**, revolving field design with temperature compensated solid state voltage regulator and brushless rotating rectifier exciter system. No brushes shall be allowed. The stator shall be directly connected to the engine flywheel housing, and the rotor shall be driven through a semi-flexible driving flange to ensure permanent alignment. The insulation shall be Class H defined by NEMA MG1.65. Generator design shall

prevent potentially damaging shaft currents. **Provide manufacturers certified motor starting capability curves to substantiate specified starting capabilities and manufacturer's verifications of temperature rise compliance.**

- G. Alternator Instrument Panel: The alternator instrument panel shall be wired, tested, and shock mounted on the generating set by the manufacturer of the alternator. It shall be microprocessor based, password protected and NFPA 110 compliant. It shall contain panel lighting, manual reset field circuit breaker, **main breaker**, frequency meter, running time meter, voltage adjusting rheostat, AC voltmeter, AC ammeter, volt/ammeter phase selector with OFF position, and fine speed control potentiometer. Alternator main breaker (s) shall be supplied with an interrupting rating suitable for alternator maximum fault currents. Main breakers on this project shall be rated for operation at maximum generator output. **Generators shall have 100% rated main breaker for breakers over 250 amps 80% circuit breaker shall be rated 125% of the nameplated current rating of the generator.** Digital metering is acceptable.
- H. Safety Shutdown monitoring System: The electric generating plant shall be provided with automatic safety shutdowns including individual alarm terminals plus individual indicating lights revealing which safety caused shutdown. This monitoring system shall include protections and indications as listed below. Provide single "GENERAL ALARM" output dry contact that will close when items 2 thru 12 below occurs. This will be connected to the Owners SCADA system.
1. Run
 2. Pre-warning low oil pressure
 3. Low oil pressure
 4. Pre-warning high engine temperature
 5. High engine temperature
 6. Over speed
 7. Low engine temperature
 8. Plant failed to start (over crank)
 9. Switch off
 10. High engine temperature, pre-warning
 11. Temperature
 12. One (1) extra fault lights
- I. Unit Performance: Frequency regulation shall not exceed 0.3 hertz from no load to rated load. Voltage regulation shall be within plus or minus 2% of rated voltage, from no load to full rated load. Recovery testable operation shall occur within 2 seconds. Stable or steady state operation is defined as operation with terminal voltage remaining constant within plus or minus 1% of rated voltage. A rheostat shall be provided with a minimum of plus or minus 5% voltage adjustment from rated value. Temperature rise shall be within NEMA MG1-22.40 definition. The generator set & regulator must sustain at least 90% of no load voltage for ten seconds with 250% of rated load at near zero power factor connected to its terminals. The alternator, exciter and voltage regulator shall be designed & manufactured by the generator set manufacturer so that the characteristics shall be matched to the torque curve of the prime mover. This design allows the prime mover to utilize its fullest power producing capacity.
- J. Electric Plant Mounting: The electric plant shall be mounted on a rigid base. Isolation isolators shall be provided for installation beneath skid.

- K. Housing: The complete generating set shall be enclosed in a weather protected, sound attenuated welded and bolted reinforced metal housing with **hinged lockable metal panel doors**. Housing shall have louvered air openings as required. Housing should be constructed of powder-coated aluminum painted in accordance with **UL 2200 paint standard** with hinged doors. House to have a louvered air intake. **Provide 100A single phase 120/240V load center and a GFI receptacle for the battery charger. Provide factory documentation of housing wind load design.**
- L. Silencer: A critical exhaust silencer shall be insulated and factory mounted **internal** to the unit. It shall be terminated by the vendor with an outlet extension pipe having a flapper to protect against rain entry.
- M. Batteries: Starting batteries with cables and racks inside of housing shall be furnished along with manufacturers recommended battery float charger with a minimum 10 amp output.
- N. Fuels Storage Tank: Diesel fueled unit shall be provided with a double wall sub-base diesel storage tank mounted under the generator set. The fuel tank capacity shall be the larger of **24 hour run time at 100% load and 72 hour run time at 50% load** unless an exact fuel capacity is indicated elsewhere. It shall have the structural integrity to support the generator set with its accessories and be furnished with all mounting hardware and fuel connections. Furnish with a low fuel level alarm switch, and leak detection alarm switch, both wired to annunciator lights on the generator control panel. **Tank shall be U.L. labeled with required emergency vent and lockable fill cap. After the unit has been tested, the installation contractor shall fill the tank with fuel.**
- O. Warranty: The engine generating set shall be warranted for a period of Two (2) years from the date of initial start-up. **Warranty shall cover 100% parts, labor and travel of all parts and equipment supplied. The vendor shall submit their comprehensive warranty documents as well as those from the manufacturer to ensure that these requirements are met.**
- P. Supervisory Engineer: **The unit shall be started and placed in operation at the job site at full load using a portable load bank for two hours** in the presence of the Owner or his representatives. The supplier of the electric plant shall furnish the necessary engine lubricating oil, load bank and optimum solution of ethylene glycol engine coolant and test run the unit. The supplier of the plant shall provide the services of a factory trained technician to assist in the testing and to instruct Owner's personnel in proper maintenance and operation of the unit. Four (4) full Operation & Maintenance Manuals (including full engine manuals) and parts lists shall be provided unless more than 4 is required in other sections of these specifications.
- Q. Shop Drawing Submittal: The engine/generator supplier shall refer and include with his submittal an engineered drawing showing the proper interconnection of his equipment with that of others specific to this project. Terminal numbers of his equipment are to be included on this interconnection drawing. Standard drawings showing various options that may or may not be included in the supplied equipment will not be considered as the drawing specified above but may be submitted in addition to that specified. Submittals that are unclear and/or cause the engineer to ponder will be rejected.
- R. Access Steps: The generator set manufacturer/vendor shall provide access steps as required to allow the operator to easily access the control panel, controls, instruments, main circuit breaker and panelboard.
- S. Remote E-Stop: The generator set manufacturer/vendor shall provide a remote E-Stop in accordance with NEC 445.18(C). Remote E-Stop enclosure shall be NEMA 3R. Install remote E-Stop where shown on the Drawings or as directed by the Engineer.

2.02 AUTOMATIC TRANSFER SWITCH (ATS)

- A. The Contractor shall furnish and install automatic transfer switch(es) as shown on the Drawings and as described below. Switches shall be double-throw and shall switch to the off position before re-transferring to normal source. Programmed transition shall allow for timed load disconnect between power sources, 0-5 minutes adjustable. The automatic transfer switches shall be warranted for a period of two (2) years from the date of initial start-up. **Warranty shall cover 100% parts, labor and travel of all parts and equipment supplied. The vendor shall submit their comprehensive warranty documents as well as those from the manufacturer to ensure that these requirements are met.**
- B. Switch(es) shall be rated as follows:
- | | |
|--------------|----------------------------------|
| 1. Quantity | One (1) |
| 2. Ampere | As shown on the One Line Diagram |
| 3. Voltage | Nominal system voltage |
| 4. Poles | 3 |
| 5. WCR | 65,000A |
| 6. Enclosure | NEMA 3R painted steel |
- C. The Automatic Transfer switch shall be a non-fused fully rated enclosed switch which complies to NEMA ICS2-447, NFPA 70, NFPA 99, NFPA 110, and UL 1008. It shall have front access to all control panels and contacts. Main contact material shall consist of silver (87% min) and cadmium. Plexiglas covers shall shield electronic controls and main contact connections. Wiring shall be numbered for easy identification. The Break before Make transfer action shall be required no more than 3 cycles and the mechanism shall incorporate lifetime lubrication within a temperature range of -29 degrees C to 60 degrees C (-20 degrees F to 140 degrees F). It shall incorporate solid state programmable logic, be assembled and tested, and include:
1. Sheet steel enclosure with hinged, gasketed, key lockable door.
 2. Operating transfer switch consisting of single solenoid, electrically operated, **mechanically held**.
 3. Solderless connectors for normal source cables, emergency source cables, load cables, and solid neutral bar.
 4. High fault withstanding capacity.
 5. Voltage monitoring of each phase of normal source (full protection), adjustable 70 to 90 percent.
 6. Voltage of emergency at transfer, 70 to 90 percent (factory set 90 percent).
 7. Frequency of emergency at transfer, 70 to 90 percent (factory set 90 percent).
 8. Voltage and frequency monitoring of one phase of emergency source.
 9. Time delay, engine starting, adjustable 0.1 to 10 seconds, set at 3 seconds.
 10. Engine minimum run (5 to 30 minutes) (factory set 20 minutes).
 11. Engine Cool down timer factory set 5 minutes.
 12. Time delay, normal to emergency (0.1 to 6 second adjustable).
 13. Time delay emergency to normal (1 to 30 minutes) (factory set 5 minutes).
 14. In phase monitor. Monitors the normal and emergency sources and permits transfer in either direction only when the phase angles of both sources are in phase and have a frequency difference within $\pm$ two cycles. Not required on programmed transition switches.

15. Three position mode selector switch in the face of the enclosure, \ marked auto, test, and fast test.
16. Exerciser (7 days from initial command).
17. Transfer when exercising (on/off switch)
18. Pilot lights in face of enclosure which the ATS is connected.
19. Auxiliary C-form contacts for normal and emergency.
20. Furnish all lugs as required to receive the incoming and outgoing.
21. Internal cabling, terminal boards, fuses, fuse nameplates, and miscellaneous hardware as needed.
22. Software consisting of dimensional drawing, drawing, electrical schematic, and parts list.

PART 3 - EXECUTION

3.01 DEMOLITION

- A. The Contractor shall disconnect and remove all existing electrical and instrumentation equipment that is not to remain in service at the completion of this project, and which is located in buildings or areas to be renovated. Verify that the equipment is not being used and not going to be used. All removed equipment shall be turned over to the Owner for selection of items that he wishes to keep in stores. All other items shall be properly disposed of by the Contractor.

3.02 COORDINATION WITH FACTORY SERVICEMEN

- A. The Contractor shall coordinate his work with the factory serviceman of the various vendors and shall provide whatever assistance is necessary to place the entire system in operation.

3.03 COORDINATION WITH THE POWER COMPANY

- A. All work on the service entrance from weather head or pad mounted transformer to utilization equipment shall be per local power company requirements. Where there is conflict with plans and specifications with the power company requirements, the power company requirements shall govern. The Contractor shall notify the engineer in advance of making a change for the Engineer's approval. In some instances, larger wire and conduit sizes may be required. The Contractor shall anticipate this requirement and include it in the bid price.
- B. The Contractor shall coordinate all work with the local power company including scheduling and applying for service, furnishing, and/or installing all metering equipment and installing all service entrance weather heads at elevation as required by power company and NEC.
- C. Seal all conduits entering panels with duct seal where it is possible that water or moisture can enter electrical equipment. Utilize weather heads for all overhead service wire entering conduit. Where service conduit is installed by power company, the contractor shall furnish a properly sized weather head to the power company to prevent water from entering any panel in which it terminates.

3.04 ELECTRICAL TECHNICIANS

- A. The Contractor shall employ and pay for electrical technicians as necessary to ensure proper installation, connection, testing, and placing into proper service electrical equipment. Utilize

experienced personnel only. Coordinate all work with other vendors' technicians and service personnel.

3.05 SCHEDULING WORK

- A. The Contractor shall schedule and sequence the electrical work such that the plant/facility downtime is kept to a minimum.
- B. Contractor shall coordinate with the project engineer in advance for any required electrical service interruption.

3.06 GROUNDING

- A. The Contractor shall furnish and install a complete grounding system to provide a safe operating environment. Additional wires for grounding may be required in certain conduit runs. Install as required per NEC. Additional ground rods may also be required to obtain the minimum ground resistance required by NEC. Furnish and install as required to meet the requirements of NEC.

3.07 SUBMITTALS

- A. Submittal data shall include, but not be limited to the following requirements:
 - 1. Complete materials list and items proposed to be furnished and installed.
 - 2. Enclosure dimensions materials of construction and NEMA ratings.
 - 3. Circuit Breaker Interrupting Ratings
 - 4. All electrical drawings so that the system can be checked for compatibility with other systems to which it interfaces.
- B. Any submittals that are not complete, cause the Engineer to ponder, or where it is obvious that no effort was made to properly prepare them for easy checking by the Engineer will be rejected in their entirety.
- C. Submittals sent to Engineer for processing that require information on equipment has not been previously submitted for approval may or may not be reviewed before dependent submittals are sent.

3.08 SUBSTITUTIONS

- A. On any proposed substitute to the specified item, it shall be the responsibility of the Contractor to show proof to the Engineer, that the proposed substitute is equal to the specified item by making written evaluation comparisons on material, performance, workmanship, maintenance features, energy use, durability, appearance, and the effect on compatibility with the other elements of the system which the item will be used. All changes required in the wiring and other electrical modifications shall be the responsibility of the Contractor.

3.09 OTHER PROVISIONS

- A. Where there are conflicts between various sections of the electrical specifications and/or drawings and/or other sections of the specifications, then the more stringent wording for a particular product, material, or item of work shall apply unless approved otherwise by the Engineer. Should a discrepancy occur, notify the Engineer before proceeding. The electrical drawings show the general locations of the equipment. The Contractor shall refer to the mechanical and civil drawings to obtain more accurate and the latest location of the equipment as well as to scale the drawings for distances. Equipment shown shall be mounted and placed so

as not to violate any OSHA or NEC rules as to working space and obstruction clearance. Seal all conduits entering panels with duct seal where it is possible that water or moisture can enter the conduit due to its location or in case of damage to the conduit (use silicon where shown on Drawings or indicated in these specifications).

3.10 STARTUP

- A. The Contractor is responsible for “startup” of the proposed equipment and systems. Startup shall include any and all required programming, setpoints, testing, etc. as may be required to start up the equipment and systems and to satisfy the Operational Period requirements of the General Requirements.

END OF THIS SECTION