



**San Jacinto River Authority
Purchasing Department
1577 Dam Site Road
Conroe, Texas 77304**

**REQUEST FOR COMPETITIVE SEALED PROPOSALS
CSP 19-0055**

**WOODLANDS DIVISION
WASTEWATER TREATMENT FACILITY NO. 2 GENERATOR
REPLACEMENT**

Date Issued: MAY 17, 2019

**Response Due Date & Time: JUNE 14, 2019 at 11:00 AM CDT
Location for Delivery: as stated above**

SJRA PROJECT NO. WDPR0101.1003.2N001

**San Jacinto River Authority Technical Services Department
Kalluri Group, Inc. – Texas Firm No. F-665**

NIGP CLASS and ITEM

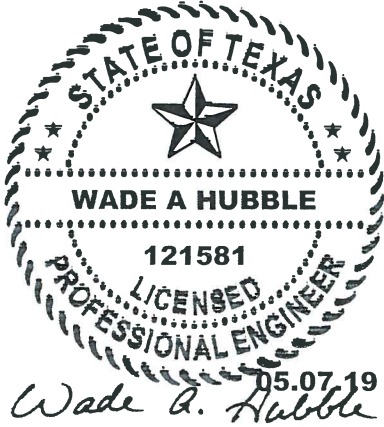
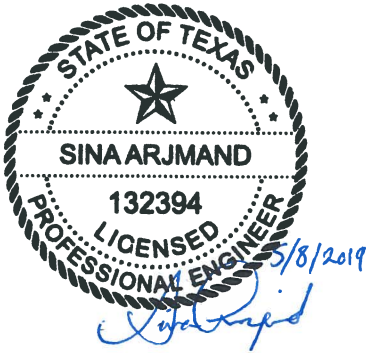
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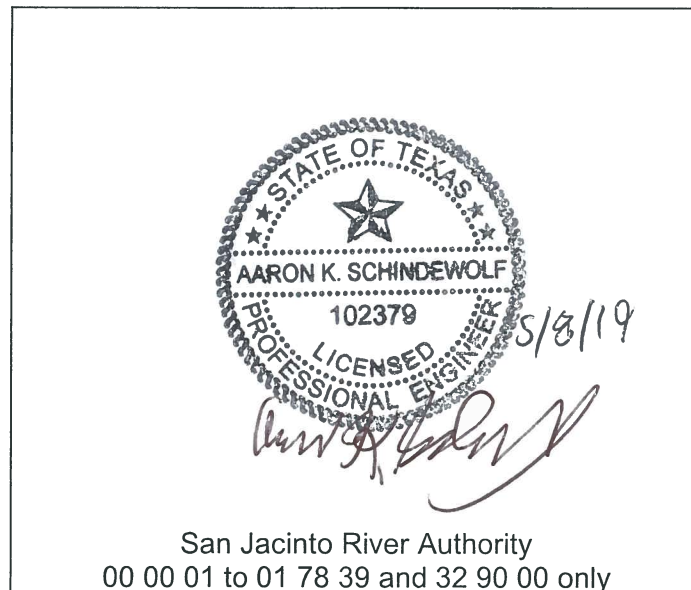
Disclosure Requirements

Chapter 176 of the Texas Local Government Code mandates the public disclosure of certain information concerning persons doing business or seeking to do business with the San Jacinto River Authority, including affiliations and business and financial relationships such persons may have with San Jacinto River Authority officers. An explanation of the requirements of Chapter 176, applicable forms and a complete text of the new law are available at: <http://www.sjra.net>. If you are unable to obtain such information online, please contact the San Jacinto River Authority Purchasing Department, 1577 Dam Site Road, Conroe, Texas 77304 or call (936) 588-3111.

BY DOING BUSINESS OR SEEKING TO DO BUSINESS WITH THE SAN JACINTO RIVER AUTHORITY, YOU ACKNOWLEDGE THAT YOU HAVE BEEN NOTIFIED OF THE REQUIREMENTS OF CHAPTER 176 OF THE TEXAS LOCAL GOVERNMENT CODE AND THAT YOU ARE SOLELY RESPONSIBLE FOR COMPLYING WITH THEM.

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 <p>Kalluri Group, Inc. – Texas Firm No. F-665 10 14 00, 26 05 00 to 26 41 19 only</p>	 <p>San Jacinto River Authority 03 09 00 only</p>
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WASTEWATER TREATMENT FACILITY NO. 2 GENERATOR REPLACEMENT

SIGNATURE PAGE

CSP NO. 19-0055
CONTRACT NO. 19-0055
PROJECT NO. WDPR0101.1003.2N001

<u>Doc.</u>	<u>Document Title</u>	<u>Doc. Date</u>
<u>No.</u>		

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INVITATION TO SUBMIT PROPOSALS

GENERAL NOTICE

The San Jacinto River Authority is requesting Competitive Sealed Proposals (CSP) for the Construction of the following project in Montgomery County, Texas:

CSP No. 19-0055 – Wastewater Treatment Facility No. 2 Generator Replacement

PROJECT DESCRIPTION

Installation of Owner-provided 1,500 kW diesel standby generator. Work to include site preparation and installation of concrete foundation for proposed generator at location of existing conduit stub-ups, setting and bolting of generator to foundation, installation of raised platform and all other components included with generator (see attached submittal) electrical work inside adjacent electrical building to disconnect conduit and wiring from existing generator, and electrical work inside adjacent electrical building for installation of conduit and wiring to connect new generator. The new generator will be delivered to the site by Owner or Owner's vendor. The scope of this project will include the need for the contractor to remove and set the generator from the Owner's or Owner vendor's vehicle. The contractor will need to coordinate with the Owner (construction manager) and Owner's representatives to schedule delivery time and date of generator to the site. The submittal(s) for the Owner provided generator will be provided as reference material with this package.

Competitive Sealed Proposals must be delivered to the San Jacinto River Authority, G&A Building, 3rd Floor Receptionist, 1577 Dam Site Road, Conroe, TX 77304 no later than 11:00 AM (CDT) on JUNE 14, 2019. Proposals will be publicly opened and read aloud at this time. Address proposals to:

Elton D. Brock, MBA, CTPM, CTCM, CPSM, C.P.M.
Purchasing Manager
San Jacinto River Authority
Purchasing Department
1577 Dam Site Road
Conroe, TX 77304

A mandatory Pre-Submittal Conference will be held at the Woodlands Division, 2436 Sawdust Road, The Woodlands, TX 77380, at 10:00 AM CDT on MAY 29, 2019. Proposals will not be accepted from Offering Firms which fail to attend the Pre-Submittal Conference.

A complete set of (CSP) Documents may be accessed via a link from the SJRA Website (<http://www.sjra.net/purchasing/bidopportunities/>), Purchasing Tab, Bid Opportunities.

Attendance at the Pre-Submittal Conference may be the only opportunity for Offerors to see the existing conditions of the site prior to Proposal due date.

The SJRA reserves the right to reject any or all Proposals and to waive informalities and irregularities.

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SECTION 00 21 13.02CN

**INSTRUCTIONS TO OFFERORS
(COMPETITIVE SEALED PROPOSALS)**

1. Overview of Competitive Sealed Proposal Process.

The objective of the Competitive Sealed Proposal (CSP) process is to competitively procure goods and services with the firm whose Proposal provides the best value for the Owner (SJRA). Proposals will be received, publically opened, and the names and monetary Proposals of Offerors read aloud. Subsequently, the Proposals will be ranked according to the criteria described in this CSP Document. Both cost and non-cost factors will be evaluated and scored. One or more Offerors may be invited back for discussions or to present their Proposal to the SJRA before the final rankings are made.

The SJRA may enter into contract negotiations with the highest ranked firm for the completion of the Work. If the negotiations with the highest ranked firm are unsuccessful, the SJRA will formally close negotiations with this firm and initiate contract negotiations with the next highest ranked firm. Upon Standard Form of Agreement between both parties, a Contractor-executed Contract may be recommended for approval by the SJRA Board of Directors or the SJRA General Manager, as applicable. Upon approval, the Contract will be executed by the General Manager of the SJRA.

2. Defined Terms.

- 2.1. Definitions for the following terms used in these Instructions do not replace definitions for similar terms that may be contained within other sections of the Contract Documents.
- 2.2. Certain additional terms used in these Instructions to Offerors have the meanings indicated below and are applicable to both the singular and plural thereof.
 - 2.2.1. Addendum or Addenda- Additions, deletions, and/or changes to any part of the CSP issued in writing by the Owner prior to Proposal due date and time.
 - 2.2.2. Apparent Best Value Offeror- the Offering Firm whose Proposal for completion of the Work provides the best value for the Owner as defined by the ranking detailed in Article 11 of Instructions to Offerors.
 - 2.2.3. Board of Directors – The governing body of the SJRA comprised of seven (7) directors appointed to six (6) year terms by the Governor of the state of Texas.
 - 2.2.4. Contract Negotiations- Discussions which take place between the Owner and the Apparent Best Value Offeror in an effort to reach Standard Form of Agreement on contract scope of work, price, time and other contractual requirements.

- 2.2.5. Contractor – The successful Offeror to this CSP who enters into a contractual relationship with the Owner for completion of the Work, following any contract approval by the SJRA Board of Directors or the SJRA General Manager, as applicable.
- 2.2.6. CSP Document- Abbreviation of the Competitive Sealed Proposals Document, the document used to request Competitive Sealed Proposals for the procurement of goods and services as authorized under Government Code Chapter 2269, Subchapter D.
- 2.2.7. Engineer's Opinion of Probable Construction Cost – Engineer's opinion of project construction cost to owner developed by the Principal Architect/Engineer. Actual contract amount may vary significantly.
- 2.2.8. Issuing Office - The location from which the CSP Documents are issued. For this project the issuing office is San Jacinto River Authority, 1577 Dam Site Road Conroe, Texas 77304.
- 2.2.9. Offeror, Offering Firm- Firm which responds to a CSP by submitting a Proposal directly to Owner. Offeror and Offering Firm shall have the same meaning in the Instructions to Offerors.
- 2.2.10. Owner - The San Jacinto River Authority (SJRA).
- 2.2.11. Proposal- Offeror's submittal which conforms to the requirements set forth in this CSP.
- 2.2.12. Proposal Form- As detailed in the requirements of this CSP, contains unit pricing for all parts of the Work and their aggregate as detailed and affirmed on the Proposal Form and may include additional forms supplied by Offeror and/or the Owner that relate to the Offeror's proposed cost for completing the Work.
- 2.2.13. SJRA- San Jacinto River Authority, a government agency whose mission is to develop, conserve, and protect the water resources of the San Jacinto River basin.
- 2.2.14. Statement of Qualifications, (SOQ) - Offeror submitted documents which describe the Offering Firm's qualifications for performing the Work and contain no pricing or cost data. Requirements for the Statement of Qualifications (SOQ) are set forth in Article 8 and Article 10 of the Instructions to Offerors (this CSP).
- 2.2.15. Subcontractor - Any contractor hired by the Contractor to furnish services, or goods and services, specified in this CSP.
- 2.2.16. Successful Offeror - The Firm who has completed negotiations with the Owner and, following any approval by the SJRA Board of Directors or the SJRA General Manager, as applicable, is selected to enter into a Contract with the Owner to complete the Work.
- 2.2.17. Supplier- Any supplier of materials and/or equipment to Contractor for the Project.

3. Schedule.

CSP Documents Posted on Website:	MAY 17, 2019
Legal Advertisements:	MAY 17, 2019
	MAY 24, 2019
Pre-Proposal Conference (Mandatory):	MAY 29, 2019, 10:00 am (CDT)
Deadline for Questions and Inquiries:	MAY 31, 2019, 10:00 am (CDT)
Proposal Submission Deadline:	JUNE 14, 2019, 11:00 am (CDT)
Anticipated Construction Start:	AUGUST, 2019

4. Competitive Sealed Proposal Documents/Copies.

4.1. This Request for Competitive Sealed Proposals (CSP) consists of the following documents:

- 4.1.1. Invitation to Submit Proposals (00 11 13);
- 4.1.2. Instructions to Offerors (00 21 13.02);
- 4.1.3. Proposal Form (00 41 00.02), Contractor shall also complete and submit the provided Microsoft Excel spreadsheet of the Proposal Form;
- 4.1.4. Statement of Qualifications (00 21 13.03);
- 4.1.5. All Contract Documents referenced in this CSP;
- 4.1.6. Addenda to this CSP issued by the SJRA Purchasing Department;
- 4.1.7. Any attached forms; and
- 4.1.8. Proposal Security (Offeror's Bond)

4.2. A complete set of CSP Documents may be accessed may be viewed and accessed via a link from the SJRA Website (<http://www.sjra.net/purchasing/bidopportunities/>) Purchasing Tab (Bid Opportunities).

4.3. Complete sets of CSP Documents must be used in preparing Proposals; neither Owner nor Principal Architect/Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of CSP Documents.

4.4. Owner and Principal Architect/Engineer, in making copies of CSP Documents available on the above terms, do so only for the purpose of obtaining Proposals for the Work and do not confer a license or grant for any other use.

5. Competitive Sealed Proposal Process\Contract Documents.

5.1. All questions about the Competitive Sealed Proposal Process or the meaning or intent of the Contract Documents are to be directed to the SJRA Purchasing Department.

Contact:

Elton D. Brock, MBA, CTPM, CTCM, CPSM, C.P.M.
Purchasing Manager
San Jacinto River Authority
Purchasing Department
1577 Dam Site Road
Conroe, TX 77304

- 5.2. All questions shall be submitted to the buyer referenced above via email.
- 5.3. Interpretations or clarifications considered necessary by Owner in response to such questions will be issued by Addenda and posted via link a link from the SJRA Website (<http://www.sjra.net/purchasing/bidopportunities/>) Purchasing Tab (Bid Opportunities).

6. Pre-Submittal Conference.

- 6.1. A single mandatory Pre-Submittal Conference will be conducted at the offices of the San Jacinto River Authority, Woodlands Division, 2436 Sawdust Road, The Woodlands, TX. 77380, (281-367-9511) at 10:00 A.M, MAY 29, 2019. Representatives of Owner and Principal Architect/Engineer will be present to discuss the project. Proposals will not be accepted from offering firms who fail to attend the pre-submittal conference.
- 6.2. All questions about the meaning or intent of the Competitive Sealed Proposal and Contract Documents are to be directed to the SJRA Purchasing Department. The SJRA Purchasing Department will address all questions as Owner considers necessary in response to inquiries arising at the conference through written Addenda and posted via link a link from the SJRA Website (<http://www.sjra.net/purchasing/bidopportunities/>) Purchasing Tab (Bid Opportunities). Oral statements may not be relied upon and will not be binding or legally effective.

7. Estimated Budget.

- 7.1. An Engineer's Opinion of Probable Construction Cost (project cost estimate) has been generated by the Principal Architect/Engineer. If an award is made, the actual contract amount may vary.
- 7.2. The Engineer's Opinion of Probable Construction Cost for this project is \$160,000.00.

8. Basis for Ranking of Proposals.

- 8.1 The Owner will consider the qualifications (Statement of Qualifications) of the Offerors and their respective proposed Contract Price (Proposal Form) when evaluating Proposals to determine which Offeror, in the sole opinion of the Owner,

will provide the best value to the Owner. All procurements shall conform to Chapter 2269 of the State of Texas Government Code. The Proposals will be evaluated using the following criteria and weighting:

- 8.1.1. Proposed Project Cost: The Offeror's Proposed Cost of Performing the Work shall be indicated as the "Total Proposal Price" (indicated as "D" on in the Proposal Form (Specification Section 00 41 00.02). The Owner has established an internal budget for this Project. The total Proposal Price is defined per the Proposal Form to include the cost(s) of the proposed Total Base Items ("A"). The Total Proposal Price may and at the Owner's sole discretion, be inclusive of the individual or collective costs associated with the Offeror's Total Extra unit Price Items ("B"), and Total Cash Allowances ("C"). For example: Total Proposal Price ("D") = A + B + C.

The Owner will evaluate the Total Proposal Price (including an requested costs for Extra Unit Price Items, Cash Allowances and Alternate Items, as identified) that the Owner can award with its available budget at the time Contract is negotiated. Attach the Proposal Form and all information/documents required to be submitted with the Proposal. Contractor shall also complete and submit the provided Microsoft Excel spreadsheet of the Proposal Form.

- 8.1.2. Experience/Past Performance of Offeror with Similar Projects: Provide general information about the Organization as required in Table 1 and Table 2 of Specification Section 00 21 13.03 Statement of Qualifications (SOQ). Provide any additional information as required by the Construction Experience section of Table 2. Describe the Organizational structure and the qualifications of the management team as it relates to this Project in Table 3. Provide a narrative format as described in Table 4, describe Offeror's experience as a general contractor and describe the Organization's operating philosophy and approach to constructing, completing, and commissioning projects. Describe the Organization's approach to managing Subcontractors and Suppliers (Table 11), quality management and construction contract administration. Limit the narrative portion responding to this criterion to no more than 10 pages in length. Provide a list of projects completed by the Organization in the last five (5) years using copies of Table 5.

Experience should include, as a minimum, six (6) similar projects performed in the last ten (10) years for installation of natural gas generators 100 kW and larger. An even higher point score will be given to Offerors whose proposed key personnel have obtained the given minimum experience within the last five (5) years.

Offeror must demonstrate experience in the construction of projects of similar construction cost and/or techniques and describe how they intend to

provide the needed experience and expertise. Submit descriptions of projects on which proposed key personnel have experience by submitting completed copies of the attached Table 12, with at least one project for each of the key individuals. If Offeror does not have specific experience with projects of this type and magnitude, the Offeror may describe its proposed approach and how its experience with other projects enhances its capability to successfully complete this Project. Offeror may submit photographs, project descriptive narratives, letters of recommendation, project awards, and references to demonstrate experience in constructing a project which meets the Owner's expectations for a quality Project constructed on time and within budget (Tables 13 and 14). This narrative is not to exceed one (1) page in length.

Provide information to demonstrate the ability of the Organization to complete projects within budget and on time. Offerors are to provide a tabulation of all projects completed by the Organization within the last five (5) years on Tables 13 and 14 to demonstrate performance in these areas. Comments may be added to the tabulations to indicate any reasons for amending the contract amounts or completion dates. Provide narrative information to indicate the number of projects and dollar volume currently under contract by the Organization and the projected completion date of each active project. Describe how the resources dedicated to these assignments will impact Offeror's ability to effectively execute the construction of this Project. Provide an estimate of the amount of the Project that will be done using in-house resources and the amount to be performed by Subcontractors and Suppliers. This narrative is not to exceed five (5) pages in length.

- 8.1.3. Experience and Qualifications of Proposed Key Personnel with Similar Projects: Provide information on the managerial structure and the key personnel that will be actively working on this Project in Tables 6 through 10 and Table 12. Key personnel include the Project Manager, Project Superintendent, Safety Manager, and Quality Control Manager. If more than one of these key roles are to be filled by one individual, provide this with the list of proposed individuals. The Offeror is to provide a list of individuals from which the individual for any given position may be selected if the Offeror is not able to commit to one individual for the Project at the time the Proposal is submitted. Qualifications of these individuals will be considered in evaluating the qualifications of the Offeror. The Proposal must offer to commit the services of the proposed key personnel for the life of the Project as a condition of qualification. Failure to offer to commit the proposed key Personnel may result in the disqualification of the Offeror and may void the award of the Contract.

Provide the resumes (not to exceed one page for each) of proposed key personnel with the SOQ describing their education and experience in Table

6. Include more detailed information on projects on which they have had significant involvement in the last five (5) years, or that demonstrate their experience with similar projects. This list is to include the name and a current telephone number of references for each of these project assignments. Offerors are to include a list of the current project assignments for each of the individuals proposed, the anticipated completion date for this assignment and the percentage of the time they will have available to devote to this Project. The Project Superintendent must be dedicated to this Project full time for the duration of the Project.

8.1.4. Approach: The Offeror shall include a brief write-up, not to exceed three (3) pages, that summarizes the Offeror's approach to overall project sequence of construction for entire project limits and corresponding time lines, proposed construction methods, and site restoration. Also include description of generator offloading and setting procedures.

8.1.5. Financial Management (Stability): Provide the past two (2) years of available financial statements, preferably audited, with this Proposal. Provide financial statements showing the name and address of the firm preparing the financial statements and the date of preparation. Offerors may choose to report on the financial stability of their Organization to demonstrate that they have the ability to complete the Project in a manner that will not impose undue efforts on the part of the Owner to invoke rights under bonds to complete the Project or for Offeror to meet financial obligations. Describe the Offeror's systems and philosophy for financial management of the Project. Describe Offeror's systems and philosophy for contracting with Subcontractors and Suppliers and managing payments and retainage. Provide other information if desired to demonstrate solid financial management practices that will enhance completion of the Project. This narrative is not to exceed two (2) pages in length.

This is a Pass or Fail. Any Offeror receiving a score of "Fail", will be automatically disqualified.

8.1.6. Other Factors: The Owner will consider other factors in evaluating Proposals, including the following (narratives for this Section shall not exceed five (5) pages total in length):

8.1.6.1. Safety: Demonstrated success in the implementation of a project site safety program. This may be demonstrated by documentation of the Offeror's safety program, and statement regarding their commitment to safety. Indicators such as the EMR (Experience Modification Ratio) may be used to demonstrate the effectiveness of the safety program.

8.1.6.2. Claims Experience and Litigation History: List all claims or litigation involving construction project owners that have been filed within the

last five (5) years, whether or not still outstanding. Provide a brief description of the nature of each suit and, if not already resolved, when it is anticipated that the suit will be resolved.

8.2. Table of criteria and weighting for the ranking of Offeror's Proposals.

Rating Category	Description	Weighting Points
8.1.1	Proposed Project Cost (E= A+B+C+D)	50
8.1.2	Experience/Past Performance of Offeror with Similar Projects	15
8.1.3	Experience and Qualifications of Proposed Key Personnel with Similar Projects	15
8.1.4	Project Approach	15
8.1.5	Financial Management (Stability)	Pass/Fail
8.1.6	Other Factors	5
Total		100

9. Proposal Form.

- 9.1. A Proposal Form (00 41 00.02) is included with the CSP Documents; additional copies may be obtained at (<http://www.sjra.net/purchasing/bidopportunities/>)(Purchasing Tab).
- 9.2. All blanks on the Proposal Form must be completed in ink, by hand, or electronically printed.
- 9.3. Contractor shall also complete and submit the provided Microsoft Excel spreadsheet of the Proposal Form. Template may be obtained via the SJRA website (<http://www.sjra.net/purchasing/bidopportunities/>) (Purchasing Tab).
- 9.4. The Proposal price shall include such amount as the Offeror deems proper for overhead and profit.

10. Offering Firm's Statement of Qualifications (SOQ).

- 10.1. SOQs shall not exceed fifteen (15) pages, including transmittal letters and narratives, and excluding completed SOQ tables and attachments, covers and plain section dividers. SOQs shall be printed on single side 8 ½" by 11" pages with not less than 1 inch margins, not less than 1.25 line spacing and not less than 11 point font.
- 10.2. The SOQ must be submitted with the Proposal and include, as a minimum, the information as described in Article 8, Basis for Ranking of Proposals. Failure to submit the required information in the SOQ may result in the Owner considering the Proposal non-responsive and result in rejection of the Proposal by Owner.

Offerors may be required to provide supplemental information if requested by the Owner to clarify, enhance or supplement the information provided in the SOQ.

- 10.3. Offerors must provide requested SOQ information using the tables provided in specification section 00 21 13.03 - Statement of Qualifications. A copy of these tables will be made available in Microsoft Word to assist with the preparation of the SOQ. Information in these tables must be provided completely and in detail. The information in these tables will be used to make direct comparisons with the information provided by other Offerors. Failure to include the information completely and clearly may result in lower scores in the evaluations. Information that cannot be totally incorporated in the table may be included in an appendix to the table. Appendices must be clearly referenced by appendix number in the table, and the appended material must include the appendix number on every sheet of the appendix. Each appendix must include only the information that responds to the question or item number to which the appended information applies. The required tables are listed below:

Table 1	General Information
Table 2	Organizational Experience
Table 3	Organizational Structure
Table 4	Project Experience and Resources
Table 5	Current Projects and Projects Completed within the last 5 Years
Table 6	Proposed Key Personnel
Table 7	Proposed Project Managers
Table 8	Proposed Project Superintendent
Table 9	Proposed Project Safety Manager
Table 10	Proposed Quality Control Manager
Table 11	Subcontractors and Suppliers
Table 12	Project information for Key Personnel
Table 13	Demonstration of Budget Performance
Table 14	Demonstration of On-time Performance

- 10.4. Offerors may provide supplemental information to the SOQs using AIA, AGC or other industry standard SOQ tables and / or Offerors may submit additional information such as organizational brochures or other marketing information to help demonstrate their ability to provide best value to the Owner. This information may not be submitted as a substitute to the information specifically requested in this Section, or in the SOQ tables. If this information is to be

included as an appendix to the information requested in Article 10.3. (above), the appendix must specify the paragraph or section to which the appendix applies and the paragraph or section must accurately reference the appendix.

11. Ranking of Offeror's Proposals.

- 11.1. The Owner will consider the qualifications (Statement of Qualifications) of the Offerors and Offeror's proposed Subcontractors, Suppliers and consultants, in addition to the proposed cost(s) (Proposal Form) when evaluating Proposals to determine which Proposal offers the best value to the Owner. Owner will rank each of the Offeror's Proposals based on the criteria and criteria weighting described in Article 8, Basis for Ranking of Proposals.
- 11.2. Evaluation and ranking of the Proposals will be completed no later than the 45th Calendar day after the date of Proposal opening. Offerors are requested not to withdraw their Proposals within ninety (90) Calendar days from the date on which Proposals are opened. Proposal Security of the highest ranking firms will be held by the Owner until contract negotiations are finalized.
- 11.3. In evaluating Proposals, Owner will consider the selection criteria set forth in Article 8 of these Instructions to Offerors and whether or not the Proposals comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested by Owner.
- 11.4. Owner may consider the qualifications and experience of Subcontractors, Suppliers, and other persons and organizations proposed for those portions of the Work as to which the identity of Subcontractors, Suppliers, and other persons and organizations must be submitted as provided in the General Conditions. Owner may also consider the operating costs, maintenance requirements, performance data and guarantees of major items of materials and equipment proposed for incorporation in the Work when such data is required to be submitted prior to recommendation of award to Owner's Board of Directors or its General Manager, as applicable.
- 11.5. Owner may conduct such investigations as Owner deems necessary to assist in the evaluation of any Proposal and to establish the responsibility, qualifications and financial ability of Offerors, proposed Subcontractors, Suppliers and other persons and organizations to perform and furnish the Work in accordance with the Contract Documents to Owner's satisfaction within the prescribed time.
- 11.6. The Owner, at its discretion, may also choose to conduct interviews with the top ranking Offerors to provide Offerors a better opportunity to demonstrate they can provide the best value to the Owner for this Project. Should the Owner

choose to conduct interviews with the top ranking Offerors, they will be notified of:

- 11.6.1. The time and place for the interview.
- 11.6.2. Interview format and agenda.
- 11.6.3. Questions to prepare for the interview.
- 11.6.4. Individuals that are expected to participate in the interview.

Failure to participate in the interview may result in disqualification from consideration for the Project.

12. Award of Contract.

- 12.1. It is the intent of the San Jacinto River Authority to award this contract to the Offering Firm whose Proposal for completion of the Work provides the best value for the Owner after consideration of the relative importance of costs and other evaluation factors described in the Basis for Ranking Proposals set forth in Article 8 of these Instructions to Offerors.
- 12.2. The Owner reserves the right to adopt the most advantageous interpretation of the Proposals submitted in the case of ambiguity or lack of clearness in stating Proposal Prices, to reject any or all Proposals, and/or to waive informalities.
- 12.3. Owner reserves the right to reject any or all Proposals, including without limitation the rights to reject any or all nonconforming, nonresponsive, unbalanced, or conditional Proposals and to reject the Proposal of any Offeror if Owner determines that an award to that Offeror would not provide the best value for the Owner, whether because the Proposal is not responsive or the Offeror is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by Owner.
- 12.4. Owner also reserves the right to waive all informalities not involving price, time or changes in the Work and to negotiate contract terms with the Apparent Best Value Offeror. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between words and figures will be resolved in favor of the words.
- 12.5. The qualifications of a firm shall not deprive the Owner of the right to accept a Proposal, which in its judgment offers the best value to the Owner. In addition, the Owner reserves the right to reject any Proposal where circumstances and developments have, in the opinion of the Owner, changed the qualifications or responsibility of the firm.

- 12.6. Material misstatements in the information submitted for evaluation may be ground for rejection of Offeror's Proposal. Any such misstatement, if discovered after award of the contract to such firm, may be grounds for immediate termination of the contract. Additionally, the Offeror will be liable to the Owner for any costs or damages to the Owner resulting from such misstatements, including costs and attorneys' fees for collecting such costs and damages.
- 12.7. If the Contract is to be awarded, it will be awarded to the Apparent Best Value Offeror following successful Contract Negotiations and following any required approval by the SJRA Board of Directors or the SJRA General Manager, as applicable.
- 12.8. If Contract Negotiations with the Apparent Best Value Offeror are unsuccessful, The Owner will formally close Contract Negotiations with this Firm and attempt to open Contract Negotiations with the next highest-ranked firm according to the selection criteria set forth in Article 8 of these Instructions to Offerors.
- 12.9. If the Contract is to be awarded, Owner will notify Successful Offeror of intent to submit contract for approval by SJRA's Board of Directors within ninety (90) Calendar days after the day of the Proposal opening. Following approval by the SJRA Board of Directors or the SJRA General Manager, as applicable, the General Manager of the SJRA may execute the contract.
- 12.10. The Offeror may submit exceptions or alternatives not in accordance with the terms and conditions of the Contract Documents, or for Work that is not in strict compliance with the Contract Documents. In such event, Offeror must describe the intent and substance of the changes in the Proposal in adequate detail so they are clearly identifiable and understandable. Alternates will not be considered in the ranking and evaluation of the Proposals. Upon selection of the Proposal that offers the best value to the Owner, the Owner and Principal Architect/Engineer may consider proposed alternates in negotiating a final Contract scope, time/schedule and price.
- 12.11. Addenda may be issued to clarify, correct, or change the Contract Documents, prior Addenda or the related supplemental data as deemed advisable by Owner or Principal Architect/Engineer.

13. Interpretation and Addenda.

- 13.1. All questions about the meaning or intent of the Competitive Sealed Proposal and Contract Documents are to be directed to the SJRA Purchasing Department in writing. Interpretations or clarifications considered necessary by Owner's Representative in response to such questions will be issued by written Addenda and

posted via a link from the SJRA website (<http://www.sjra.net/purchasing/bidopportunities/>)
Purchasing Tab (Bid Opportunities).

Contact:

Elton D. Brock, MBA, CTPM, CTCM, CPSM, C.P.M.
Purchasing Manager
San Jacinto River Authority
Purchasing Department
1577 Dam Site Road
Conroe, TX 77304

- 13.2. To properly qualify their Proposal, each Offeror shall, prior to submitting their Proposal, check the receipt of all Addenda and acknowledge such receipt on the Proposal Form and on the acknowledgement line of the Addendum Cover page. Proposals submitted without such acknowledgment of all issued Addenda and letters of clarification may cause Proposal to be considered non-responsive. Such Addenda and letters of clarification shall become a part of the executed contract and modify the contract documents accordingly.
- 13.3. Questions received after the deadline for Questions and Inquiries may not be answered.
- 13.4. Only questions answered by formal written Addenda issued by Owner will be binding. Oral and other interpretations or clarifications will be without legal effect.
- 13.5. Addenda may be issued to clarify, correct, or change the Contract Documents, Addenda or the related supplemental data as deemed advisable by Owner or Principal Architect/Engineer. Addenda may also be issued to modify the CSP Documents as deemed advisable by Owner or Principal Architect/Engineer.
- 13.6. Notification of Addenda will be by default via the SJRA Purchasing Department.
- 13.7. The Owner will not be responsible or liable for any failure. Offerors are encouraged to visit the SJRA webpage where the CSP Documents are issued until the legal limit for filing addenda (48 hours prior to Proposal due date and time) has passed to ensure receipt of all addenda.

14. Confidentiality of Proposal Information.

All materials submitted to the SJRA and upon receipt by the SJRA become public property and are subject to the Texas Public Information Act, Government Code Chapter 552. If an Offeror does not desire proprietary Information in the SOQ to be disclosed, each page must be identified and marked proprietary at the time of

submittal. The SJRA will, to the extent provided by law, endeavor to protect such information from disclosure. The final decision as to what information must be disclosed, however, lies with the Texas Attorney General. Failure to identify proprietary information will result in all unmarked sections being deemed non-proprietary and available to the public upon request. Proposers shall not be permitted to mark entire Proposal as proprietary.

15. Examination of Contract Documents and Site.

15.1. It is the responsibility of each Offeror before submitting a Proposal:

- 15.1.1. To examine thoroughly the Contract Documents and other related data identified in the CSP Documents (including "technical data" referred to below);
- 15.1.2. To visit the site to become familiar with and satisfy Offeror as to the general, local and site conditions that may affect cost, progress, performance or furnishing of the Work;
- 15.1.3. To consider federal, state and local Laws and Regulations that may affect cost, progress, performance or furnishing of the Work;
- 15.1.4. To study and carefully correlate Offeror's knowledge and observations with the Contract Documents and such other related data; and
- 15.1.5. To promptly notify The SJRA Purchasing Department of all conflicts, errors, ambiguities or discrepancies which Offeror has discovered in or between the Contract Documents and such other related documents.

15.2. Reference is made to the General Conditions Article 4 and Contract Specification Section 00 31 19 – Existing Condition Information for identification of:

- 15.2.1. Reports of explorations and tests of subsurface conditions at or contiguous to the site which have been utilized by Principal Architect/Engineer in preparation of the Contract Documents. While such reports are intended to be an accurate record of the conditions at the specific boring locations on the date taken, it is not a guarantee of specific Site conditions which may vary between boring locations and over time, and Offerors may not rely upon the general accuracy of the "technical data" contained in such reports and upon other data, interpretations, opinions or information contained in such reports or otherwise relating to the subsurface conditions at the site, nor upon the completeness thereof for the purposes of preparing a Proposal for construction.
- 15.2.2. Copies of such reports will be made available by Owner to any Offeror on request. Such reports are not part of the Contract Documents. Offeror is responsible for any interpretation or conclusion drawn from

any "technical data" or any such data, interpretations, opinions or information. Offeror acknowledges that Owner and Principal Architect/Engineer disclaim any responsibility for the accuracy, correctness, completeness, suitability, and sufficiency of such reports and for Offeror's interpretation of such reports.

- 15.3. Information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the site are based upon information and data furnished to Owner and Principal Architect/Engineer by owners of such Underground Facilities or others, and Owner and Principal Architect/Engineer do not assume and expressly disclaim responsibility for the accuracy or completeness thereof or for Offeror's interpretation of such information and data. The Contractor is advised to coordinate closely with Owner, Principal Architect/Engineer and Utility Operator(s) prior to the commencement of any underground construction activities.
- 15.4. Provisions concerning responsibilities for the adequacy of data furnished to prospective Offerors with respect to subsurface conditions, other physical conditions and Underground Facilities, and possible changes in the Contract Documents due to differing or unanticipated conditions appear in Article 6 of the Standard Form of Agreement and Article 4.2 of the General Conditions.
- 15.5. Before submitting a Proposal, each Offeror will be responsible for obtaining such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and underground facilities) at or contiguous to the site or otherwise, which may affect cost, progress, performance or furnishing of the Work, or which relate to any aspect of the means, methods, techniques, sequences or procedures of construction to be employed by Offeror and safety precautions and programs incident thereto or which Offeror deems necessary to determine its Proposal for performing and furnishing the Work in accordance with the time, price and other terms and conditions of the Contract Documents.
- 15.6. On request, the SJRA Purchasing Department may provide each Offeror access to the site to conduct such examinations, investigations, explorations, tests and studies, as each Offeror deems necessary for submission of a Proposal. Offeror must fill any resultant holes and clean up and restore the site to its former condition upon completion of such explorations, investigations, tests and studies.
- 15.7. The lands upon which the Work is to be performed, rights-of-way and easements for access thereto and other lands designated for use by Contractor in performing the Work are identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor.

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

- 15.8. Reference is made to Specification Section 01 11 13 - Work Covered By Contract Documents for the identification of the general nature of Work that is to be performed at the site by the Owner or others (such as utilities and other prime Contractors) that relates to the Work for which a Proposal is to be submitted. On request, Owner may provide to each Offeror for examination access to or copies of Contract Documents (other than portions thereof related to price) for such Work.
- 15.9. The submission of a Proposal will constitute an incontrovertible representation by Offeror that Offeror has complied with every requirement of this Article 15, that without exception the Proposal is premised upon performing and furnishing the Work required by the Contract Documents and applying the specific means, methods, techniques, sequences or procedures of construction (if any) that may be shown or indicated or expressly required by the Contract Documents, that Offeror has given Owner or Principal Architect/Engineer written notice of all conflicts, errors, ambiguities and discrepancies that Offeror has discovered in the Contract Documents and the written resolutions thereof by Principal Architect/Engineer are acceptable to Offeror, and that the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.
- 15.10. The provisions of 15.1 through 15.9, inclusive, do not apply to Asbestos, Polychlorinated biphenyls (PCBs), Petroleum, Hazardous Waste or Radioactive Material covered by Article 4.4 Hazardous Conditions of the General Conditions.

16. Proposal Security.

- 16.1. Each Proposal must be accompanied by Proposal Security made payable to the Owner in the amount not less than five percent (5%) of the total Proposal Amount, including any Cash Allowances and Alternates, and shall be in the form of a cashier's check or Offeror's Bond.
- 16.2. Offeror's Bond must be on the form provided within the Contract Documents (CSP) and must bear the impressed seal of the Surety, and be signed by the Offeror and an authorized individual of the Surety. Bonds will only be accepted from Sureties authorized to issue bonds in accordance with state law.
- 16.3. The Proposal Security of Successful Offeror will be retained until such Offeror has executed the Standard Form of Agreement, furnished the required contract securities and met the other conditions contained in Specification Section 00 41 00.02 – Proposal Form, whereupon the Proposal Security will be returned. If the Offeror fails to execute and deliver the Standard Form of Agreement and furnish

the required contract security within ten (10) Calendar days after the SJRA Board of Directors has approved a contract award, Owner may annul its award and the Proposal Security of that Offeror will be forfeited. The Proposal Security of other Offerors whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of the seventh day after the Effective Date of the Standard Form of Agreement or the ninety-first day after the Proposal opening, whereupon Proposal Security furnished by such Offerors will be returned. Proposal Security, if submitted in the form of cashier's check, submitted with Proposals which are not competitive will be returned within ten (10) Calendar days after the Proposal opening.

17. Contract Times.

The number of Calendar days within which, or the dates by which, the Work is to reach Substantial and Final Completion are set forth in Specification Section 00 52 00 – Standard Form of Standard Form of Agreement between Owner and Contractor.

18. Substitutes and "Or-Equal" Items.

The Contract, if awarded, will be on the basis of goods and services described in the Drawings or specified in the Specifications with consideration for possible substitute or "or equivalent" items. Whenever it is indicated in the Drawings or specified in the Specifications that a substitute or "or-equal"/"or equivalent" item of material or equipment may be furnished or used by Contractor if acceptable to Principal Architect/Engineer and Owner, application for such acceptance may be made prior to Contract award in accordance with Texas Government Code 2269.155. See section 6.02.5 in the General Conditions of the Contract for more information.

19. Subcontractors, Suppliers and Others.

- 19.1. If the Owner requests the identity of certain Subcontractors, Suppliers or other persons or organizations (including those who are to furnish the principal items of material and equipment) to be submitted to Owner, Apparent Best Value Offeror, and any other Offerors so requested, shall within five (5) Calendar days from request submit to Owner a list of all such Subcontractors, Suppliers or other persons or organizations proposed for those portions of the Work for which such identification is requested. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, person or organization if requested by Owner. If the Owner or Principal Architect/Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, other person or organization, Owner may, before giving notice of its intent to recommend award to Owner's Board of Directors, request that Apparent Best Value Offeror submit an acceptable substitute without an increase in price.

If Apparent Best Value Offeror declines to make any such substitution, Owner may formally close contract negotiations with Offeror and enter into contract negotiations with the next most highly-ranked Offeror that proposes to use acceptable Subcontractors, Suppliers and other persons and organizations. The declining to make requested substitutions will not constitute grounds for sacrificing the Proposal Security of any Offeror. Any Subcontractor, Supplier, other person or organization listed and to whom Owner or Principal Architect/Engineer does not make written objection prior to giving notice of its intent to recommend Award to Owner's Board of Directors will be deemed acceptable to Owner and Principal Architect/Engineer, subject to revocation of such acceptance after the Effective Date of the Standard Form of Agreement as provided in Article 6.04 of the General Conditions.

- 19.2. No Contractor shall be required to employ any Subcontractor, Supplier, other person or organization against whom Contractor has reasonable objection.

20. Preparation of Proposals.

- 20.1. Prepare one (1) unbound original of the complete Proposal Package, including the completed Proposal Form 00 41 00.02. Clearly mark this package with the word "Original". Prepare one (1) bound copy with original signatures, and one (1) electronic copy on a flash drive (in .pdf format) with a completed Proposal with original signatures, Statement of Qualifications 00 21 13.03, and a full set of Financials.
- 20.2. An Original Proposal is the Proposal containing the Original Signature of a person authorized to sign on behalf of the Offering Firm.
- 20.3. Proposals shall be enclosed in an opaque sealed Envelope (or Package), marked with CSP No. 19-0055 – Wastewater Treatment Facility No. 2 Generator Replacement and name and address of Offering Firm.
- 20.4. Each Original Proposal submitted by an Offeror shall contain the following:
- 20.4.1. Offerors Statement of Qualifications (SOQ; 00 21 13.03);
 - 20.4.2. Completed Proposal Form (00 41 00.02);
 - 20.4.3. Completed Certification of Proposal (00 41 00.02), Contractor shall also complete and submit the provided Microsoft Excel spreadsheet of the Proposal Form;
 - 20.4.4. Form of Business (00 45 20);
 - 20.4.5. Proposal Security (Offeror's Bond 00 43 13);
 - 20.4.6. Resolution of Contractor (00 45 43);
 - 20.4.7. Conflict of interest Forms (Form CIQ; 00 45 10) shall be submitted under a separate cover and not included in the sealed Proposal;
 - 20.4.8. One (1) flash drive with a Completed Proposal with Original signatures, Statement of Qualifications (SOQ) and a full set of Financials; and

- 20.4.9. Any other Documentation required by the terms of this Competitive Sealed Proposal.
- 20.5. Conflict of Interest Questionnaire, Specification Section 00 45 10 of Contract shall be submitted under separate cover. If Offering Firm affirms that there are no Conflicts of Interest, Offeror shall indicate so by writing name of firm and "No Conflicts" on CIQ form and signing form.
- 20.6. Proposals submitted by corporations must be executed in the corporate name by the president or a vice-president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal must be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation must be shown below the signature.
- 20.7. Submitted Proposals by partnerships must be executed in the partnership name and signed by a partner, whose title must appear under the signature and the official address of the partnership must be shown below the signature.
- 20.8. All names must be typed or printed in ink below the signature.
- 20.9. The Proposal shall contain an acknowledgment of receipt of all Addenda (the numbers of which must be filled in on the Proposal Form).
- 20.10. The address and telephone number for communications regarding the Proposal must be shown.
- 20.11. Evidence of authority to conduct business as an out-of-state corporation in the state where the Work is to be performed shall be provided in accordance with Specification Section 00 41 00.02 – Proposal Form. State Contractor license number, if any, must also be shown.

21. Submission of Proposals.

- 21.1. Proposals shall be submitted at the time and place indicated in the Invitation to Submit Proposals (00 11 13) and accompanied by the Proposal Security and other required documents.
- 21.2. If the Proposal is sent through the mail or other delivery system the sealed envelope shall be enclosed in a separate envelope with the notation "SEALED PROPOSAL ENCLOSED" on the face of it. Proposals not received by the time or at the location specified will be returned unopened to the Offeror.
- 21.3. The clock used by the Owner at the place used for receiving Proposals shall conclusively determine the time that Proposals are received.

- 21.4. Proposals sent by facsimile or electronic mail or delivered to any other location other than the address provided in the Invitation to Offerors will NOT be accepted.

22. Modification and Withdrawal of Proposals.

- 22.1. Proposals may be modified or withdrawn by a document duly executed (in the same manner that a Proposal must be executed) and delivered to the place where Proposals are to be submitted prior to the date and time for the opening of Proposals.
- 22.2. If, within twenty-four (24) hours after Proposals are opened, any Offeror files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material or substantial mistake in the preparation of its Proposal, that Offeror may withdraw its Proposal. The Proposal Security may be retained by the Owner if Offeror cannot clearly demonstrate to the Owner evidence of a material or substantial mistake in its Proposal. Thereafter, that Offeror may be disqualified from responding to a reissued CSP for the Work to be furnished under these Contract Documents.

23. Opening of Proposals.

Proposals will be opened and (unless obviously non-responsive) the names and Monetary Proposals of Offering Firms read aloud at a public opening. An abstract of the Proposals will be made available no later than the seventh day after the Contract is awarded.

24. Proposals to Remain Subject to Acceptance.

All Proposals will remain subject to acceptance for ninety (90) Calendar days after the date of the opening, but Owner may, in its sole discretion, release any Proposal and return the Proposal Security prior to that date.

25. Prevailing Wage Rates.

Contractors for this Project must pay no less than the prevailing wage rates for the area established by the San Jacinto River Authority and included in Specification Section – 00 73 43 – Wage Scale for Construction.

26. Liquidated Damages or Economic Disincentives.

Provisions for liquidated damages or economic disincentives are set forth in Specification Section 00 52 00 -Standard Form of Standard Form of Agreement between Owner and Contractor and Specification Section 00 72 00 – General Conditions of the Contract.

27. Contract Security and Insurance.

Article 5 of the General Conditions sets forth Owner's requirements as to insurance and Performance and Payment Bonds. When the Successful Offeror delivers the original, hard copy executed Standard Form of Agreement to Owner, it must be accompanied by evidence of insurance and unsigned Performance and Payment Bonds as required by Article 5 of the General Conditions, unless prior written approval of Contractor's evidence of insurance and unsigned performance and payment Bond forms has been received from the SJRA Purchasing Department. Such evidence of insurance shall include, without limitation, all required certificates and endorsements, evidencing all required coverages, limits of liability, additional insured status, waivers of subrogation and other insurance requirements.

28. Conflict of Interest and Disclosure of Interested Parties.

28.1 Chapter 176 of the Texas Local Government Code mandates the public disclosure of certain information concerning persons doing business or seeking to do business with the San Jacinto River Authority, including affiliations and business and financial relationships such persons may have with San Jacinto River Authority officers. An explanation of the requirements of Chapter 176, applicable forms and a complete text of the law are available at:
<http://www.ethics.state.tx.us/forms/CIQ.pdf>.

BY DOING BUSINESS OR SEEKING TO DO BUSINESS WITH THE SAN JACINTO RIVER AUTHORITY, YOU ACKNOWLEDGE THAT YOU HAVE BEEN NOTIFIED OF THE REQUIREMENTS OF CHAPTER 176 OF THE TEXAS LOCAL GOVERNMENT CODE AND THAT YOU ARE RESPONSIBLE FOR COMPLYING WITH THEM.

28.2 Texas Government Code Section 2252.908 requires persons who enter into a contract with a government entity to submit a disclosure of interested parties (Form 1295) to the government entity or state agency at the time business entity submits the signed contract to the government entity or state agency. Use the following link to access filing instructions:
https://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm.

29. Taxes.

Owner is exempt from payment of sales and use taxes of the State of Texas and of cities and counties thereof, on all goods and services to be incorporated into the Work. Said taxes shall not be included in the Proposal.

29.1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of goods to be incorporated into the Work.

- 29.2. Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to goods not incorporated into the Work, except to the extent the exemption referred to in paragraph 18.4 applies to the Project to exempt taxes on any such items.
- 29.3. If the Project is construction of a water or wastewater system certified by the Texas Commission on Environmental Quality as a regional system, equipment, services and supplies used solely to construct the Project are exempted from taxes imposed by Chapter 151, Limited Sales, Excise and Use Tax, Texas Tax Code. Said taxes shall not be included in the Proposal. Owner will furnish any required certificates of tax exemption to Contractor.

30. Verification Company Does Not Boycott Israel

Pursuant to Section 2270.002 of the Texas Government Code, the Contractor shall be required to execute contemporaneous with its execution of the Standard Form of Agreement a verification that Contractor does not Boycott Israel and Contractor will not Boycott Israel during the term of this Standard Form of Agreement. "Boycott Israel" as used herein means refusing to deal with, terminating business activities with, or otherwise taking any action that is intended to penalize, inflict economic harm on, or limit commercial relations specifically with Israel, or with a person or entity doing business in Israel or in an Israeli-controlled territory, but does not include an action made for ordinary business purposes.

31. Signing of Standard Form of Agreement.

SJRA's Purchasing Department will transmit to the Successful Offeror the required number of unsigned counterparts of the Standard Form of Agreement with all other written Contract Documents attached. Contractor shall deliver original, hard copies of the required number of counterparts of the Standard Form of Agreement and written Contract Documents signed by Contractor, unsigned Bond forms, evidence of insurance as set out in Section 27 above, signed disclosure of interested parties (Form 1295), signed Conflict of interest Questionnaire, and signed and notarized Verification Company Does Not Boycott Israel, to SJRA Purchasing Department ten (10) Calendar days prior to the SJRA Board of Directors Meeting for which a contract award is anticipated. Notwithstanding the foregoing, the Standard Form of Agreement may be executed using electronic signatures at the option and in the discretion of Owner, and, in such event, the provisions of the Uniform Electronic Transaction Act, Chapter 332, Texas Business and Commerce Code, as amended, and any applicable policies and procedures of Owner regarding electronic signatures shall apply. However, the requirements of this Section 31 apply regardless of whether or not the Standard Form of Agreement is also executed using electronic signatures or transmitted electronically. Following and subject to award, the Owner shall deliver one (1) fully signed counterpart of the Standard Form of Agreement to Contractor. Within three (3) Calendar days of Contractor's receipt of the fully executed Standard Form of

Agreement, the Contractor shall deliver the original, hard copy fully executed Bonds to SJRA Purchasing Department.

END OF SECTION

TABLE 1 – GENERAL INFORMATION				
Organization Doing Business As:				
Business Address of Principle Office:				
Main Telephone Number:				
Fax Number:				
Web Site Address:				
Form of Business (check one):	<input type="checkbox"/> Corporation	<input type="checkbox"/> Partnership	<input type="checkbox"/> Individual	<input type="checkbox"/> Joint Venture
IF A CORPORATION				
Date of Incorporation:				
State of Incorporation:				
Chief Executive Manager's Name:				
President's Name:				
Vice President's Name(s):				
Secretary's Name:				
Treasurer's Name:				
IF A PARTNERSHIP				
Date of Organization:				
General or Limited Partnership?:				
IF AN INDIVIDUAL				
Name:				
Business Address:				
IF A JOINT VENTURE				
Name of Lead Joint Venture Manager:				
Name of Firm:				
Joint Venture Partner Manager(s):				
Name of Firm(s):				
Individuals Not Listed Above Having Significant Business Control:				
Indicators of Organization Size:				
Current Number Full Time Employees:		Estimate of Current Year's Revenue:		
Average Number of Projects per Year:		Average Project Construction Cost:		

TABLE 2 – ORGANIZATIONAL EXPERIENCE

Organization Doing Business As:	
Business Address of Principle Office:	
Main Telephone Number:	
Fax Number:	
Web Site Address:	
Organization Doing Business As:	

ORGANIZATIONAL HISTORY

List of names that this organization has operated under over the history of the organization, including the names of related companies presently doing business:

Names of Organization:	From Date	To Date

List of companies, firms or organizations that own any part of the organization.

Name of Companies, Firms or Organization:	Percent Ownership

CONSTRUCTION EXPERIENCE

1.	Years' experience in projects similar to the proposed project:				
	<table border="1"> <tr> <td>As a General Contractor:</td> <td></td> <td>As a Joint Venture Partner:</td> <td></td> </tr> </table>	As a General Contractor:		As a Joint Venture Partner:	
As a General Contractor:		As a Joint Venture Partner:			
2.	Has this or a predecessor organization ever defaulted on a project or failed to complete any work awarded to it? If yes provide full details in a separate attachment. (Attachment #_____)				
3.	Has this or a predecessor organization been released from a bid or proposal in the past ten years? If yes provide full details in a separate attachment. (Attachment #_____)				
4.	Has this or a predecessor organization ever been disqualification as a bidder or Offeror by any local, state, or federal agency within the last five (5) years? If yes provide full details in a separate attachment. (Attachment #_____)				
5.	Is this organization or your proposed surety currently in any litigation or contemplating litigation? If yes provide full details in a separate attachment. (Attachment #_____)				
6.	Has this or a predecessor organization ever refused to construct or refused to provide materials defined in the contract documents? If yes provide full details in a separate attachment. (Attachment #_____)				
7.	<p>Has your company, firm, corporation, or business implemented an Employee Health and Safety Program compliant with 29 CFR 1910 "General Industry Standards"</p> <p>https://www.osha.gov/pls/oshaweb/owasrch.search_form?p_doc_type=STANDARDS&p_toc_level=1&p_keyvalue=1910 and/or 29 CFR 1926 "General Construction Standards"</p> <p>https://www.osha.gov/pls/oshaweb/owasrch.search_form?p_doc_type=STANDARDS&p_toc_level=1&p_keyvalue=1926 as they apply to your Company's customary activities?</p>				

8.	Has your company, firm, corporation, partnership, or institution represented by the company, firm, corporation, partnership, or anyone acting in representation, received citations for violations of OSHA within the past three (3) years? If YES, please provide the following additional information: Date of offense, location of establishment inspected, category of offense, final disposition of offense, if any, and penalty assessed.	
9.	Has your company, firm, corporation, partnership, or institution represented by the company, firm, corporation, partnership, or anyone acting in representation received citations for violations of environmental laws or regulations, of any kind or type, within the past five (5) years? Citations include notice of violation, notice of enforcement, suspension/revocations of state or federal licenses, or registrations, fines assessed, pending criminal complaints, indictments, or convictions, administrative orders, draft orders, final orders, and judicial final judgments. If YES, please provide the following additional information: Date of offense, location of where offense occurred, type of offense, final disposition of offense, if any, and penalty assessed.	
10.	Has your company, firm, corporation, partnership, or institution represented by the company, firm, corporation, partnership, or anyone acting in representation ever been convicted, within the past ten (10) years, of a criminal offense which resulted in a serious bodily injury or death? If YES, please provide the following additional information: Date of offense, location of where offense occurred, type of offense, final disposition of offense, if any, and penalty assessed.	
11..	Has your company filed or been named in any litigation involving your company and the Owner on a contract within the last five (5) years under your current company name or any other company name? If so, provide details of the issues and resolution if available. Include lawsuits where Owner was involved. (Notice: Failure to disclose this information during proposal submission, and later discovered, may result in contract termination at SJRA's option.)	
12.	Please provide a history of all OSHA actions, advisories, etc., Contractor has received on all jobs worked in any capacity, prime, or subcontractor. The history shall be for the two-year period preceding the Bid Date of the Project.	
13.	Please provide a list of all on-the-job injuries, accidents, and fatalities suffered by any present or former employees of Contractor during the same two-year period.	
14.	If less than the two-year period, give the date Contractor started doing business.	

THIS FORM MUST BE RETURNED WITH THE PROPOSAL RESPONSE

TABLE 3 – ORGANIZATIONAL STRUCTURE	
Organization Doing Business As:	
PROPOSED PROJECT ORGANIZATION	
1. Provide a brief description of the managerial structure of the organization and illustrate with an organizational chart. Include the title and names of key personnel. Include this chart as an attachment to this description. (Attachment No. _____)	
2. Provide a brief description of the experience and qualifications of the organization's management team, including officers that will be directly involved in the project. Describe the individuals that are authorized to execute Contract Documents, Change Orders or receive payment for the organization. Include a copy of a board resolution or other documentation as appropriate for the structure of the company authorizing these individuals to conduct business on behalf of the organization. (Attachment No. _____)	
SURETY REFERENCES	

TABLE 4 – PROJECT EXPERIENCE AND RESOURCES				
Organization Doing Business As: 				
PROJECTS				
1. Provide a list of major projects that are currently underway, or have been completed within the last five (5) years on Table 5, using additional copies as required. Identify those projects which specifically illustrate the organizations capability to provide best value to the Owner for this project.				
Provide a narrative description (not to exceed 10 pages) of your organizations approach to completing this project to provide best value for the Owner. Including a description of your approach in the following areas: <ol style="list-style-type: none"> 1. Contract administration 2. Management of subcontractor and suppliers 3. Time management 4. Cost control 5. Quality management 6. Project site safety 7. Managing changes to the project 8. Managing equipment 				
EQUIPMENT				
2. Provide a list of major equipment proposed for use on this project. Attach additional information if necessary.				
Equipment item	Primary use on project	Own	Will buy	Lease
DIVISION OF WORK BETWEEN ORGANIZATION AND SUBCONTRACTOR				
3. What work will the organization complete using its own resources?				
4. What work does the organization propose to subcontract on this project?				

TABLE 5 – CURRENT PROJECTS AND PROJECTS COMPLETED WITHIN THE LAST 5 YEARS									
1	Project Owner:			Project Name:					
General Description of Project:									
Project Cost:						Date Project			
Key Project Personnel:			Project Manager		Project Superintendent		Safety Manager		Quality Control Manager
Name:									
Reference contact information (listing names indicates approval to contacting the names individuals as a reference)									
		Name		Title/Position		Organizati	Telephone		E-mail
Owner:									
Designer:									
Construction Manager:									
2	Project Owner:			Project Name:					
General Description of Project:									
Project Cost:						Date Project			
Key Project Personnel:			Project Manager		Project Superintendent		Safety Manager		Quality Control Manager
Name:									
Reference contact information (listing names indicates approval to contacting the names individuals as a reference)									
		Name		Title/Position		Organizati	Telephone		E-mail
Owner:									
Designer:									
Construction Manager:									
3	Project Owner:			Project Name:					
General Description of Project:									
Project Cost:						Date Project			
Key Project Personnel:			Project Manager		Project Superintendent		Safety Manager		Quality Control Manager
Name:									
Reference contact information (listing names indicates approval to contacting the names individuals as a reference)									
		Name		Title/Position		Organizati	Telephone		E-mail
Owner:									
Designer:									
Construction Manager:									

TABLE 6 – PROPOSED KEY PERSONNEL		
Organization Doing Business As: <input type="text"/>		
PROPOSED PROJECT ORGANIZATION		
1. Provide a brief description of the managerial structure of the organization and illustrate with an organizational cart. Include the title and names of key personnel. Include this chart as an attachment to this description. See attachment No.		
2. Provide a brief description of the managerial structure proposed for this project and illustrate with an organizational chart. Include the title and names of proposed key personnel and alternates. Include this chart at an attachment to this description. See attachment No.		
EXPERIENCE OF KEY PERSONNEL		
3. Provide information on the key personnel proposed for this project that will provide the following key functions. Provide information for candidates for each of these positions on the pages for each of these key personnel. Also provide biographical information for each primary and alternate candidate as an attachment. The biographical information must include the following as a minimum: technical experience, managerial experience, education and formal training, work history which describes project experience, including the roles and responsibilities for each assignment, and primary language. Additional information highlighting experience which makes them the best candidate for the assignment should also be included.		
Role	Primary candidate	Alternate candidate
Project Manager		
Project Superintendent		
Project Safety Manager		
Quality Control Manager		
4. If key personnel are to fulfill more than one of the roles listed above, provide a written narrative describing how much time will be devoted to each function, their qualifications to fulfill each role and the percentage of their time that will be devoted to each role. If the individual is not to be devoted solely to this project, indicate how time it to be divided between this project and their other assignments.		

TABLE 7 – PROPOSED PROJECT MANAGERS			
Organization Doing Business As:			
PRIMARY CANDIDATE			
1.	Name of Individual:		
	Years of Experience as Project Manager:		
	Years of Experience With This Organization:		
	Number of Similar Projects as Project Manager:		
	Number of Similar Projects in Other Positions:		
	Current Project Assignments:		
	Name of Assignment:	Percent of Time Used for This Project:	Estimated Project Completion Date:
2. Reference contact information (listing names indicates approval to contacting the names individuals as a reference)			
Name:		Name:	
Title/ Position:		Title/ Position:	
Organization:		Organization:	
Telephone:		Telephone:	
E-mail:		E-mail:	
Project:		Project:	
Candidate's Role on Project:		Candidate's Role on Project:	
ALTERNATE CANDIDATE			
3.	Name of Individual:		
	Years of Experience as Project Manager:		
	Years of Experience With This Organization:		
	Number of Similar Projects as Project Manager:		
	Number of Similar Projects in Other Positions:		
	Current Project Assignments:		
	Name of Assignment:	Percent of Time Used for This Project:	Estimated Project Completion Date:
4. Reference contact information (listing names indicates approval to contacting the names individuals as a reference)			
Name:		Name:	
Title/ Position:		Title/ Position:	
Organization:		Organization:	
Telephone:		Telephone:	
E-mail:		E-mail:	
Project:		Project:	
Candidate's Role on Project:		Candidate's Role on Project:	

TABLE 8 – PROPOSED PROJECT SUPERINTENDENT			
Organization Doing Business As:			
PRIMARY CANDIDATE			
1.	Name of Individual:		
	Years of Experience as Project Superintendent:		
	Years of Experience With This Organization:		
	Number of Similar Projects as Project Superintendent:		
	Number of Similar Projects in Other Positions:		
	Current Project Assignments:		
	Name of Assignment:	Percent of Time Used for This Project:	Estimated Project Completion Date:
2. Reference contact information (listing names indicates approval to contacting the names individuals as a reference)			
Name:		Name:	
Title/ Position:		Title/ Position:	
Organization:		Organization:	
Telephone:		Telephone:	
E-mail:		E-mail:	
Project:		Project:	
Candidate's Role on Project:		Candidate's Role on Project:	
ALTERNATE CANDIDATE			
3.	Name of Individual:		
	Years of Experience as Project Superintendent:		
	Years of Experience With This Organization:		
	Number of Similar Projects as Project Superintendent:		
	Number of Similar Projects in Other Positions:		
	Current Project Assignments:		
	Name of Assignment:	Percent of Time Used for This Project:	Estimated Project Completion Date:
4. Reference contact information (listing names indicates approval to contacting the names individuals as a reference)			
Name:		Name:	
Title/ Position:		Title/ Position:	
Organization:		Organization:	
Telephone:		Telephone:	
E-mail:		E-mail:	
Project:		Project:	
Candidate's Role on Project:		Candidate Role on Project:	

TABLE 9 – PROPOSED PROJECT SAFETY MANAGER			
Organization Doing Business As: _____			
PRIMARY CANDIDATE			
1.	Name of Individual: _____		
	Years of Experience as Project Safety Manager: _____		
	Years of Experience With This Organization: _____		
	Number of Similar Projects as Project Safety Manager: _____		
	Number of Similar Projects in Other Positions: _____		
	Current Project Assignments:		
	Name of Assignment: _____	Percent of Time Used for This Project: _____	Estimated Project Completion Date: _____
	_____	_____	_____
	_____	_____	_____
2. Reference contact information (listing names indicates approval to contacting the names individuals as a reference)			
Name: _____		Name: _____	
Title/ Position: _____		Title/ Position: _____	
Organization: _____		Organization: _____	
Telephone: _____		Telephone: _____	
E-mail: _____		E-mail: _____	
Project: _____		Project: _____	
Candidate's Role on Project: _____		Candidate's Role on Project: _____	
ALTERNATE CANDIDATE			
3.	Name of Individual: _____		
	Years of Experience as Project Safety Manager: _____		
	Years of Experience With This Organization: _____		
	Number of Similar Projects as Project Safety Manager: _____		
	Number of Similar Projects in Other Positions: _____		
	Current Project Assignments:		
	Name of Assignment: _____	Percent of Time Used for This Project: _____	Estimated Project Completion Date: _____
	_____	_____	_____
	_____	_____	_____
4. Reference contact information (listing names indicates approval to contacting the names individuals as a reference)			
Name: _____		Name: _____	
Title/ Position: _____		Title/ Position: _____	
Organization: _____		Organization: _____	
Telephone: _____		Telephone: _____	
E-mail: _____		E-mail: _____	
Project: _____		Project: _____	
Candidate's Role on Project: _____		Candidate's Role on Project: _____	

TABLE 10 – PROPOSED QUALITY CONTROL MANAGER			
Organization Doing Business As: _____			
PRIMARY CANDIDATE			
1.	Name of Individual:		_____
	Years of Experience as Quality Control Manager:		_____
	Years of Experience With This Organization:		_____
	Number of Similar Projects as Quality Control Manager:		_____
	Number of Similar Projects in Other Positions:		_____
	Current Project Assignments:		
	Name of Assignment:	Percent of Time Used for This Project:	Estimated Project Completion Date:
	_____	_____	_____
	_____	_____	_____
2. Reference contact information (listing names indicates approval to contacting the names individuals as a reference)			
Name:		Name:	
Title/ Position:		Title/ Position:	
Organization:		Organization:	
Telephone:		Telephone:	
E-mail:		E-mail:	
Project:		Project:	
Candidate's Role on Project:		Candidate's Role on Project:	
ALTERNATE CANDIDATE			
3.	Name of Individual:		_____
	Years of Experience as Quality Control Manager:		_____
	Years of Experience With This Organization:		_____
	Number of Similar Projects as Quality Control Manager:		_____
	Number of Similar Projects in Other Positions:		_____
	Current Project Assignments:		
	Name of Assignment:	Percent of Time Used for This Project:	Estimated Project Completion Date:
	_____	_____	_____
	_____	_____	_____
4. Reference contact information (listing names indicates approval to contacting the names individuals as a reference)			
Name:		Name:	
Title/ Position:		Title/ Position:	
Organization:		Organization:	
Telephone:		Telephone:	
E-mail:		E-mail:	
Project:		Project:	
Candidate's Role on Project:		Candidate's Role on Project:	

Organization Doing Business As:

1. Provide a list of subcontractors that will provide more than 10 percent of the work (based on contract amounts)

2. Provide information on the proposed key personnel, project experience and a description of past relationship and work experience for each subcontractor listed above using the Project Information forms.

3. Provide a list of major equipment or materials proposed for use on this project. Attach additional information if necessary.

Standard Specification
Contract No. 19-0055

TABLE 12 – PROJECT INFORMATION FOR KEY PERSONNEL							
Project Owner:			Project Name:				
General Description of Project:							
PROJECT BUDGET AND SCHEDULE PERFORMANCE							
Budget history			Schedule performance				
	Amount	% of Bid Amount		Date	Days		
Bid :			Notice to Proceed:				
Change Orders			Contract Substantial Completion Date at Notice to Proceed:				
Owner Enhancements:			Contract Final Completion Date at Notice to Proceed:				
Unforeseen Conditions:			Change Order Authorized Substantial Completion Date:				
Design Issues:			Change Order authorized Final Completion Date:				
Total:			Actual / Estimated Substantial Completion Date:				
Final Cost:			Actual / Estimated Final completion Date:				
KEY PROJECT PERSONNEL							
		Project Manager		Project Superintendent		Safety Manager	
Name:							
Percentage of Time Devoted to The project:							
Proposed for This Project:							
Did Individual Start and Complete The Project?:							
If Not, Who Started or Completed the Project in Their Place:							
Reason for Change:							
Reference Contract information (Listing names indicates approval to contact the named individuals as a reference)							
	Name	Title/ Position		Organization		Telephone	
Owner:							
Designer:							
Construction Manager:							
Surety:							
ISSUES / DISPUTES RESOLVED OR PENDING RESOLUTION BY ARBITRATION, LITIGATION OR DISPUTE REVIEW BOARDS:							
Number of Issues Resolved:		Total Amount Involved in Resolved Issues:		Number of Issues Pending:		Total Amount Involved in Resolved Issues:	

TABLE 13 – DEMONSTRATION OF BUDGET PERFORMANCE

Organization Doing Business As:

PROVIDE INFORMATION ON ALL PROJECTS COMPLETED BY THE ORGANIZATION WITHIN THE LAST FIVE (5) YEARS:

[illegible]

TABLE 14 – DEMONSTRATION OF ON-TIME PERFORMANCE

Organization Doing Business As:

PROVIDE INFORMATION ON ALL PROJECTS COMPLETED BY THE ORGANIZATION WITHIN THE LAST FIVE (5) YEARS:

[illegible]

Affidavits

One of the following four affidavits shall be executed and provided with this information. The individual signing the affidavit shall attach evidence of their authority to bind the Organization to an agreement.

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AFFIDAVIT FOR CORPORATION

State _____ §

County of _____ §

_____, being duly sworn deposes and says
(Name)

That he is _____ of the Corporation submitting the
(Title)

foregoing qualification form and related information; that he has read such documents; and that such documents are true and correct and contain no material misrepresentations; and that he is authorized to make this affidavit on behalf of the Corporation.

Signature

Signed and sworn to me before this _____ day of _____, 20 ____

Notary Public

My commission expires: _____

AFFIDAVIT FOR PARTNERSHIP

State _____ §

County of _____ §

_____, being duly sworn deposes and says
(Name)

That he is _____ of the Company submitting the
(Title)

foregoing qualification form and related information; that he has read such documents; and that such documents are true and correct and contain no material misrepresentations; and that he is authorized to make this affidavit on behalf of the Partnership.

Signature

Signed and sworn to me before this _____ day of _____, 20__

Notary Public

My commission expires: _____

AFFIDAVIT FOR INDIVIDUAL

State _____ §

County of _____ §

(Name) _____, being duly sworn deposes and says

That he is _____ of the company submitting the
(Title)

foregoing qualification form and related information; that he has read such documents; and that such documents are true and correct and contain no material misrepresentations.

Signature

Signed and sworn to me before this _____ day of _____, 20__

Notary Public

My commission expires: _____

AFFIDAVIT FOR JOINT VENTURE STATEMENT

We the undersigned do hereby give notice to our agreement to bid as a joint venture on the Project.

Name of Joint Venture

Name of firm

Signature

Signed and sworn to me before this _____ day of _____, 20__

Notary Public

My commission expires: _____

Name of firm

Signature

Signed and sworn to me before this _____ day of _____, 20__

Notary Public

My commission expires: _____

END OF SECTION

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SECTION 00 31 19

EXISTING CONDITION INFORMATION

1.1 SUMMARY

A. Section Includes:

1. Subsurface Investigation Report
2. Underground Facilities Reports
3. Existing Structures
4. Offeror Responsibilities

B. Related Specification Sections include but are not necessarily limited to:

1. Document 00 31 32 – Geotechnical Information
2. Document 00 31 32.10 – Trench Safety Geotechnical Information

1.2 MEASUREMENT AND PAYMENT (NOT USED)

1.3 SUBMITTALS (NOT USED)

1.4 SUBSURFACE INVESTIGATION REPORT (NOT USED)

1.5 UNDERGROUND FACILITIES REPORTS (NOT USED)

1.6 EXISTING STRUCTURES

- A.** Contract Documents indicate physical conditions in or relating to existing surface and subsurface structures which are at or contiguous to the site that were known to, and have been used by, the SJRA and Principal Architect/Engineer in preparation of Contract documents.

1.7 OFFEROR RESPONSIBILITIES

- A.** Offeror shall have full responsibility for reviewing and verifying information and data, for locating underground facilities and existing structures shown or indicated in the Contract Documents, and for coordination of the Work with the owners of such underground facilities and existing structures during construction.

END OF SECTION

SECTION 00 41 00.02

PROPOSAL FORM

To: The San Jacinto River Authority
1577 Dam Site Road
G & A Building, 3rd Floor Receptionist
Conroe, Texas 77304

Project: Wastewater Treatment Facility No. 2 Generator Replacement

CSP No.: 19-0055

Project No.: [SJRA Project No. WDPR0101.1003.2N001]

Offeror: _____
(Print or type full name of proprietorship, partnership, corporation, or joint venture)

1.0 OFFER

- A. Total Proposal Price:** The undersigned Offeror proposes and agrees, if this Proposal is accepted, to enter into an Agreement with Owner in the form included in the Contract Documents to perform all Work as specified or indicated in Contract Documents for the Contract Amount indicated in this Proposal or as modified by a Change Order or Change Directive.
- B. Proposal Security:** Included with the Proposal is a Proposal Security in the amount of 5 percent of the Total Proposal Price subject to terms described in Specification Section 00 21 13.02 – Instructions to Offerors.
- C. Period for Proposal Acceptance:** Offeror accepts all of the terms and conditions of the Request for Proposals and Instructions to Offerors, including without limitation those dealing with the disposition of required Bonds. This offer shall remain open to acceptance and is irrevocable for 90 days after Proposal Date (opening). That period may be extended by mutual written agreement of the SJRA and Offeror.
- D. Liquidated Damages:** Offeror accepts the provisions of the Agreement as to liquidated damages in the event of its failure to complete Work in accordance with the schedule set forth in the Agreement.
- E. Addenda:** Offeror hereby acknowledges it has received, examined and carefully studied all Addenda and all Addenda have been considered and all related costs are included in the Total Proposal Price. Offeror hereby acknowledges receipt of the following Addenda:

Addendum No.	Addendum Date	Signature Acknowledging Receipt

F. Proposal Supplements: The following documents shall be provided with the proposal:

- Offeror's Statement of Qualifications (SOQ).
- Completed Certification of Proposal
- Completed Felony Conviction Notice Form
- Form of Business 00 45 20
- Proposal Security (Offeror's Bond 00 43 13)
- Resolution of Contractor 00 45 43
- One (1) flash drive with a Completed Proposal with Original signatures, Statement of Qualifications (SOQ) and a full set of Financials.

G. Conflict of Interest Forms:

Conflict of Interest Forms (Form CIQ) shall be submitted under separate cover and not be included in the sealed proposal.

2.0 CONTRACT TIME

- A. If Proposal is accepted, Contractor shall achieve Substantial Completion of the Work within 90 calendar days after the date when the Contract Time Requirements commence to run as provided in Article 2.3 of the General Conditions, and Contractor shall achieve Final Completion within 15 calendar days after the date required for Substantial Completion of the Work, subject to adjustments of Contract Time Requirements as provided in the Contract.

3.0 OFFEROR REPRESENTATIONS

- A. Offeror is familiar with and is satisfied as to all federal, state and local laws and regulations that may affect cost, progress, performance and furnishing of the Work.
- B. Offeror has visited the Site and become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress, performance and furnishing of the Work.
- C. Offeror has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site and (2) Hazardous Conditions identified in reports and drawings provided to Offeror or available for Offeror review. Offeror understands that neither Owner nor Principal Architect/Engineer is responsible

for the accuracy of these documents and they are not part of the Contract Documents.

- D. Offeror has obtained and carefully studied all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions including surface, subsurface and Underground Improvements at or contiguous to the Site which may affect cost, progress, performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Offeror, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents to be employed by Offeror, and safety precautions and programs incident thereto.
- E. Offeror does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Proposal for performance of the Work at the Contract Amount proposed, within the Contract Time Requirements proposed and in accordance with the terms and conditions of the Contract Documents. Offeror shall make no claims against the Owner and shall bear all risk of losses, if any, resulting on account of the amount and character of the Work, or because the conditions under which the Work must be done vary or differ from conditions or information contained in the Contract Documents, or are different from what were estimated or anticipated by it.
- F. Offeror 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.
- G. Offeror has correlated the information known to Offeror, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.
- H. Offeror has given Owner or Principal Architect/Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Offeror has discovered in the Contract Documents, and the written resolution thereof by Principal Architect/Engineer are acceptable to Offeror.
- I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Proposal is submitted.
- J. Laws to be Observed: In the performance of the Contract, the Contractor must comply with all applicable federal, state, and local laws, ordinances and regulations, including but not limited to laws concerned with labor, safety,

minimum wages, and the environment. The Contractor will make himself familiar with and shall at all times observe and comply with all federal, state, and local laws, ordinances and regulations which in any manner affect the conduct of the work, and shall Indemnify and save harmless the Owner, and its representatives against any claim arising from violation of any such law, ordinance or regulation by himself or by his subcontractor or by his employees.

K. Review by Owner:

(a) The Owner and authorized representatives, agents and employees of the Owner shall at all times have access to and be permitted to observe and review all work, materials, equipment, payrolls, personnel records, employment conditions, material invoices, books and accounting records, subcontracts, purchase orders, and all other relevant data, documents and records pertaining to this Contract.

L. Offeror will submit written evidence of its authority to do business in the state where the Project is located with its Proposal, form 00 45 20 – Form of Business.

M. Offeror further represents that this Proposal is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; Offeror has not directly or indirectly induced or solicited any other Offeror to submit a false or sham Proposal; Offeror has not solicited or induced any individual or entity to refrain from submitting a Proposal; and Offeror has not sought by collusion to obtain for itself any advantage over any other Offeror or over Owner.

4.0 DEFINED TERMS:

A. Terms defined in this Proposal, if any, shall be for the purposes of this Proposal. Terms with initial capital letters not defined herein shall have the meaning assigned to them in the other Bid Documents or Contract Documents.

5.0 TOTAL PROPOSAL PRICE HAS BEEN CALCULATED BY OFFEROR, USING THE FOLLOWING COMPONENT PRICES AND PROCESS (PRINT OR TYPE NUMERICAL AMOUNTS):

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SAN JACINTO RIVER AUTHORITY
Wastewater Treatment Facility No. 2 Generator Replacement
PROPOSAL FORM

A. BASE ITEMS

Item No.	Spec. Reference	Description	Qty.	Unit	Unit Price (this column controls)	Proposal Price
1	01 71 13	Mobilization	1	LS	\$ _____	\$ _____
2	01 11 13 03 09 00	Prepare site and construct proposed generator foundation, complete in place.	1	LS	\$ _____	\$ _____
3	01 11 13	Offload Owner provided generator from delivery truck.	1	LS	\$ _____	\$ _____
4	01 11 13	Set Owner provided generator onto proposed generator foundation, and bolt to foundation per manufacturer's direction, complete in place. Install included Owner provided raised platform and all other components included with generator per attached submittal (Appendix A), complete in place.	1	LS	\$ _____	\$ _____
5	01 11 13 Division 26	Perform all electrical work required as per plans and specifications to disconnect existing generator and connect proposed Owner provided generator.	1	LS	\$ _____	\$ _____
6	01 11 13 01 75 00	Generator start-up and training, including necessary O&M manuals.	1	LS	\$ _____	\$ _____

7	01 11 13 01 74 23 32 90 00	Site Restoration, complete.	1	LS	\$ _____	\$ _____
<u>A. Total Base Items:</u>					\$ _____	

B. EXTRA UNIT PRICE ITEMS

Item No.	Spec. Reference	Description	Qty.	Unit	Unit Price (this column controls)	Proposal Price
1	01 11 13	Extra picking up and setting of generator at or near installation site.	1	EA	\$ _____ \$ ____XX.XX ¹ ____	\$ _____
<u>B. Total Extra Unit Price Items:</u>					\$ _____	

Table B Footnotes:

(1) Minimum Unit Price determined prior to Proposal. Can be increased by the Offeror by crossing out the Minimum and noting revised Unit Price on the line above.

C. CASH ALLOWANCES

Item No.	Spec. Reference	Description	Cash Allowance ¹
1	N/A	N/A	\$ _____
<u>C. Total Cash Allowances:</u>			\$ _____

Table C Footnotes:

(1) Fixed price determined prior to Proposal. Cannot be adjusted by Offeror.

**D. TOTAL PROPOSAL PRICE:
(Add Totals for Items A, B, and C)**

\$ _____

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6.0 SIGNATURES: By signing this Document, I agree that I have received and reviewed all Bid Documents, Contract Documents and Addenda and considered all costs associated with the Bid Documents, Contract Documents and Addenda in calculating the Total Proposal Price.

Offeror: _____
(Print or type full name of your proprietorship, partnership, corporation, or joint venture.*)

** By: _____
Signature Date

Name: _____
(Print or type name) Title

Doing Business as: _____

Business Address: _____
(Mailing)

(Street, if different)

Telephone and Fax Number: _____
(Print or type numbers)

* If Proposal is a joint venture, add additional Proposal Form signature sheets for each member of the joint venture.

** Offeror certifies that the only person or parties interested in this offer as principals are those named above. Offeror has not directly or indirectly entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive Proposing.

Note: This document constitutes a Governmental record, as defined by § 37.01 of the Texas Penal Code. Submission of a false Governmental record is a criminal offense as provided in § 37.10 of the Texas Penal Code.

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7.0 CERTIFICATION OF PROPOSAL

The undersigned affirms that they are duly authorized to execute this Proposal, that this Proposal has not been prepared in collusion with any other Offeror, and that the contents of this Proposal have not been communicated to any other Offeror prior to the official opening of this Proposal. Additionally, the undersigned affirms that the Offeror is willing to sign the attached SJRA Agreement (if applicable).

Signed By: _____ Title: _____

Typed Name: _____ Company Name: _____

Phone No.: _____ Fax No.: _____

Email: _____

Proposal Address: _____
P.O. Box or Street City State Zip

Order Address: _____
P.O. Box or Street City State Zip

Remit to Address: _____
P.O. Box or Street City State Zip

Federal Tax ID No.: _____

Date: _____

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FELONY CONVICTION NOTIFICATION

Any person and/or business entity that enters into a contract with the San Jacinto River Authority must give advance notice to the SJRA if any employee or an owner or operator of the business entity has been convicted of a felony. The notice must include a general description of the conduct resulting in the conviction of a felony. The notice must also describe the role that the employee, owner, or operator will perform in executing the contract. The SJRA may require substitution of employees in the performance of the contract.

The SJRA may terminate a contract with a person or business entity if the SJRA determines that the person or business entity failed to give notice as required by this clause, misrepresented the conduct resulting in the conviction, or failed to substitute personnel at SJRA's request.

I, the undersigned agent for the firm named below, certify that the information concerning notification of felony convictions has been reviewed by me and the following information furnished is true to the best of my knowledge.

Signature of Authorized Company Official

Date

Authorized Company Official's Name and Title (Printed)

Firm Name

A. My firm is not owned or operated by anyone who has been convicted of a felony nor does it have any employees who have been convicted of a felony:

Signature of Authorized Company Official

Date

B. My firm has employee(s) or is owned or operated by the following individual(s) who has/have been convicted of a felony:

Signature of Authorized Company Official

Date

C. Provide a general description of the conduct resulting in the conviction of a felony.

Signature of Authorized Company Official

Date

D. Describe the role that the person(s) convicted of a felony will play in the performance of the contract.

Signature of Authorized Company Official

Date

END OF SECTION

SECTION 00 43 13

OFFEROR'S BOND

THAT WE, _____, as Principal,
(Offeror)
("Offeror"), and the other subscriber hereto, _____, as Surety, do hereby
acknowledge ourselves to be held and firmly bound to the San Jacinto River Authority, a political sub-division of the
State of Texas, in the sum of _____ Dollars
(\$ _____) (an amount equal to five (5) percent of the Total Bid Price, including Cash Allowances and
Alternates, if any, for the payment of which sum, well and truly to be made to the San Jacinto River Authority and its
successors, the Offeror and Surety do bind themselves, their heirs, executors, administrators, successors, and
assigns, jointly and severally.

THE CONDITIONS OF THIS OBLIGATION ARE SUCH THAT:

WHEREAS, the Offeror has submitted on or about this day a proposal offering to perform the following:

(Project Name, Location and Number)
in accordance with the Drawings, Specifications, and terms and conditions related thereto to which reference is
hereby made.

NOW, THEREFORE, if the Offeror's offer as stated in the Section 00 41 00.02 – Proposal Form is accepted
by the San Jacinto River Authority, and the Offeror executes and returns to the San Jacinto River Authority Section
00 52 00 – Tandard Form of Agreement between Owner and Contractor, required by the San Jacinto River Authority,
on the forms prepared by the San Jacinto River Authority, for the Work and also executes and returns the same
number of the Performance, Payment and Maintenance Bonds (such bonds to be executed by a Corporate Surety
authorized by the State Board of Insurance to conduct insurance business in the State of Texas, and having an
underwriting limitation in at least the amount of the bond) and other submittals as required, in connection with the
Work, within the Contract Time, then this obligation shall become null and void; otherwise it is to remain in full force
and effect.

If Offeror is unable to or fails to perform the obligations undertaken herein, the undersigned Offeror and
Surety shall be liable to the San Jacinto River Authority for the full amount of this obligation which is hereby
acknowledged as the amount of damages which will be suffered by the San Jacinto River Authority on account of the
failure of such Offeror to perform such obligations, the actual amount of such damages being difficult to ascertain.

Notices required or permitted hereunder shall be in writing and shall be deemed delivered when actually
received or, if earlier, on the third day following deposit in a United States Postal Service post office or receptacle,
with proper postage affixed (certified mail, return receipt requested), addressed to the respective other Party at the
address prescribed in the Contract documents, or at such other address as the receiving Party may hereafter
prescribe by written notice to the sending Party.

IN WITNESS THEREOF, the Offeror and Surety have signed and sealed this instrument on the respective
dates written below their signatures and have attached current Power of Attorney.

ATTEST, SEAL: (if a corporation)

WITNESS: (if not a corporation)

(Name of Offeror)

By: _____
Name:
Title:

By: _____
Name:
Title:
Date:

ATTEST/SURETY WITNESS: (SEAL)

(Full Name of Surety)

(Address of Surety for Notice)

(Telephone Number of Surety)

By: _____
Name:
Title:
Date:

By: _____
Name:
Title:
Date:

END OF SECTION

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SECTION 00 45 10

CONFLICT OF INTEREST QUESTIONNAIRE

Local Government Code Chapter 176 requires Offerors with the San Jacinto River Authority ("SJRA") to file a Conflict of Interest Questionnaire with the SJRA.

The Conflict of Interest Questionnaire is available for downloading on the Texas Ethics Commission's website at: <http://www.ethics.state.tx.us/forms/CIQ.pdf>. The completed Conflict of Interest Questionnaire will be posted on the SJRA website. Also you will find a list of the SJRA Local Government Officers on the SJRA website.

For your convenience the CIQ form is attached as part of this document. Although the SJRA has provided this document for the Offeror's convenience, it is the Offeror's responsibility to submit the latest version of the CIQ form as promulgated by the Texas Ethics Commission.

The Failure of any Offeror to comply with this law is a Class C misdemeanor.

END OF SECTION

CONFLICT OF INTEREST QUESTIONNAIRE -

FORM CIQ

For vendor or other person doing business with local governmental entity

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

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

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

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

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

2 ☐ Check this box if you are filing an update to a previously filed questionnaire.

(The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date on which you became aware that the originally filed questionnaire was incomplete or inaccurate.)

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

Name of Officer

This section, (item 3 including subparts A, B, C & D), must be completed for each officer with whom the vendor has an employment or other business relationship as defined by Section 176.001(1-a), Local Government Code. Attach additional pages to this Form CIQ as necessary.

A. Is the local government officer named in this section receiving or likely to receive taxable income, other than investment income, from the vendor?
☐ Yes ☐ No

B. Is the vendor receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government officer named in this section AND the taxable income is not received from the local governmental entity?
☐ Yes ☐ No

C. Is the filer of this questionnaire employed by a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership of one percent or more?
☐ Yes ☐ No

D. Describe each employment or business and family relationship with the local government officer named in this section.

4 ☐ I have no Conflict of Interest to disclose.

5

Signature of vendor doing business with the governmental entity

Date

SECTION 00 45 20
FORM OF BUSINESS

Please mark the box describing your firm's form of business, fill in the requested information, and include the relevant attachments.

☐ **Corporation**

Corporate Name: _____
State of Incorporation: _____
Mailing Address: _____
Type of Corporation: _____

Certificate of Assumed Name, if operating under a name different than that on the corporate charter (the Certificate must have been issued within the past 10 years to be valid)

*Certificate of Good Standing

*Certificate of Existence (if non-Texas corporation, Certificate of Authority)

☐ **Partnership/Joint Venture**

Partnership/Joint Venture Name: _____
Mailing Address: _____
Type of Partnership/Joint Venture: _____

Copy of the Partnership or Joint Venture Agreement, **or**
Affidavit with the name of the partnership or joint venture, the names of the individual partners or participants in the joint venture, and a statement that the partnership or joint venture is in existence

Certificate of Assumed Name, (the Certificate must have been issued within the past 10 years to be valid)

If firm is a limited partnership, the Certificate of Limited Partnership

If any partner or joint venturer is a corporation, the above information relating to corporation must be included as to each sum partner or joint venturer.

☐ **Sole Proprietorship**

Name: _____
Mailing Address: _____

Certificate of Assumed Name, if operating under a name different than that of the sole proprietor (the Certificate must have been issued within the past 10 years to be valid)

** Must be furnished upon request of the SJRA and must be less than 90 days old.*

END OF SECTION

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SECTION 00 45 43
RESOLUTION OF CONTRACTOR

_____, (“Contractor”),
(Name of Contractor, e.g., “Biz. Inc.”, “Biz LLP”)

is a _____,
(Type of Organization, e.g.: Corporation, Limited Partnership, Limited Liability Partnership, Limited Liability Company, etc.)

which is bound by acts of _____,
(Name and Form of Governing Entity, e.g., “Biz Inc. Board of Directors”, “Bill Smith, GP”, etc.)

(“Governing Entity”).

On the _____ day of _____, 20____, the Governing Entity resolved, in accordance with all documents, rules, and laws applicable to the Contractor, that

_____, is authorized to act as the
(Contractor’s Representative)

Contractor’s Representative in all business transactions (initial one) _____ conducted in the State of Texas OR _____ related to this Contract; and

The Governing Entity warrants that the above resolution (a) was entered into without dissent or reservation by the Governing Entity, (b) has not been rescinded or amended, and (c) is now in full force and effect; and

**PART 1 - IN AUTHENTICATION OF THE ADOPTION OF THIS RESOLUTION, I
SUBSCRIBE MY NAME ON THIS _____ DAY OF _____, 20____.**

(Authorized Signature for Governing Entity)

(Print or Type Name and Title of Authorized Signatory)

SWORN AND SUBSCRIBED before me on _____
Date

Notary Public in and for the State of Texas

My Commission Expires: _____
Expiration Date

Print or Type Name of Notary Public

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SECTION 00 52 00

**STANDARD FORM OF AGREEMENT
BETWEEN OWNER AND CONTRACTOR**

THIS AGREEMENT is dated as of _____ by and between **the San Jacinto River Authority** (hereinafter called "**OWNER**") and _____ (hereinafter called "**CONTRACTOR**").

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

Article 1. WORK.

CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

Construction of **WASTEWATER TREATMENT FACILITY NO. 2 GENERATOR REPLACEMENT**

Article 2. PRINCIPAL ARCHITECT/ENGINEER AND OWNER'S REPRESENTATIVE.

The project has been designed by Aaron K. Schindewolf, P.E., SJRA Technical Services Department, 2436 Sawdust Road, The Woodlands, Texas 77380, Sina Arjmand, P.E., SJRA Technical Services Department, 2436 Sawdust Road, The Woodlands, Texas 77380, and Wade Hubble, P.E., Kalluri Group, Inc., 16300 Katy Freeway, Suite 172, Houston, Texas 77094 who is hereinafter called "PRINCIPAL ENGINEERS" and who assumes all duties and responsibilities and has the rights and authority assigned to PRINCIPAL ARCHITECT/ENGINEER in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents. OWNER'S Representative shall be the Principal Engineers (as noted above).

Article 3. CONTRACT TIMES.

The Work will be Substantially Completed within 90 **calendar days** after the date when the Contract Time Requirements commence to run as provided in Article 2.3 of the General Conditions, and CONTRACTOR shall achieve Final Completion within 15 **calendar days** of the date required for Substantial Completion.

*[Insert this paragraph only if CSP: OWNER and CONTRACTOR recognize that **time is of the essence** of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the times specified in the above paragraph, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. They also recognize the delays, expense and difficulties involved in proving the actual loss suffered by OWNER if the Work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) and, as a reasonable estimate of such damages, CONTRACTOR shall pay OWNER One Hundred Dollars (\$100.00) for each and every day of delay in CONTRACTOR achieving Substantial Completion of the Work and readiness for final payment beyond the times specified in the above paragraph. OWNER shall have the*

option of deducting the amount of any liquidated damages from any monies that may be owed to CONTRACTOR or to recover such amount from the CONTRACTOR or its sureties, at CONTRACTOR'S expense.]

Article 4. CONTRACT AMOUNT.

OWNER shall pay CONTRACTOR for completion of the Work, in accordance with the Contract Documents, an amount in current funds equal to the sum of the amounts determined to be due and owing pursuant to the Proposal and any subsequent Change Orders and Change Directives thereto.

Article 5. PAYMENT PROCEDURES.

CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by OWNER'S Representative or PRINCIPAL ARCHITECT/ENGINEER as determined by the OWNER and as provided in the General Conditions and Supplemental Conditions, if any.

OWNER shall make progress payments on account of the Contract Amount on the basis of CONTRACTOR'S Applications for Payment as recommended by OWNER'S Representative or PRINCIPAL ARCHITECT/ENGINEER and in conformance with the procedures described in the General Conditions. All such payments will be measured by the schedule of values established in Article 2.4.2.07 of the General Conditions (and on the number of units of each Unit Price item completed, if unit price contract). Upon final completion and acceptance of the Work in accordance with Article 14.11 of the General Conditions, OWNER shall pay the remainder of the Contract Amount as recommended by OWNER'S Representative as provided in said Article 14.11.

The 10 percent retainage withheld pursuant to Article 14.01.5 of the General Conditions shall be deposited in an interest-bearing account, and the interest earned on such retainage shall be paid to CONTRACTOR on completion of the contract.

Article 6. CONTRACTOR'S REPRESENTATIONS.

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

CONTRACTOR has examined and carefully studied the Contract Documents (including the Addenda listed in Article 7) and the other related data identified in the Proposal Documents.

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

CONTRACTOR is familiar with and is satisfied as to all federal, state, and local Legal Requirements that may affect cost, progress, performance, and furnishing of the Work.

CONTRACTOR has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site. CONTRACTOR acknowledges that such reports and drawings are not Contract Documents, are not warranted or represented in any manner by Owner to accurately show the conditions at

the Site, and may not be complete for CONTRACTOR'S purposes. CONTRACTOR acknowledges that OWNER and PRINCIPAL ARCHITECT/ENGINEER do not assume and expressly disclaim any responsibility for the accuracy or completeness of the information and data shown or indicated in the Contract Documents with respect to subsurface conditions or Underground Facilities at or contiguous to the Site or CONTRACTOR'S interpretation of such information and data. CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done so) all such additional supplementary research, examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site or otherwise which may affect cost, progress, performance, or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by CONTRACTOR and safety precautions and programs incident thereto. CONTRACTOR does not consider that any additional examinations, investigations, explorations, tests, studies, or data are necessary for the performance and furnishing of the Work at the Contract Amount, within the Contract Time Requirements and in accordance with the other terms and conditions of the Contract Documents.

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.

CONTRACTOR has correlated the information known to CONTRACTOR, information and observations obtained from visits to the Site, reports, and Drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

CONTRACTOR has given PRINCIPAL ARCHITECT/ENGINEER through the OWNER or OWNER'S Representative written notice of all conflicts, errors, ambiguities, or discrepancies that CONTRACTOR has discovered in the Contract Documents and the written resolution thereof by PRINCIPAL ARCHITECT/ENGINEER is acceptable to CONTRACTOR, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

Pursuant to Section 2270.002 of the Texas Government Code, contemporaneous with CONTRACTOR's execution of this Agreement, CONTRACTOR shall execute the Verification Company Does Not Boycott Israel, attached hereto and incorporated herein.

Article 7. CONTRACT DOCUMENTS.

The Contract Documents are comprised of the following:

1. This Agreement.
2. Exhibits to this Agreement: Verification Company Does Not Boycott Israel

Document	Title	Date	Page(s)
Exhibit 4	Pricing Sheet	01-22-2019	
00 41 00.02 - 9	Felony Conviction Notification	01-22-2019	1
00 45 43	Contractor Resolution	12-15-2014	2
00 45 20	Form of Business	12-15-2014	2

00 62 07	Certification Regarding Debarment	12-15-2014	2
00 21 13.03 – 16	Statement of Qualifications	12-27-2018	21
Exhibit	Conflict of Interest Form	1-22-2019	
Exhibit	Verification Company does not Boycott Israel	1-22-2019	
Exhibit	TGC 2252.152 Certification Form	1-22-2019	
Exhibit	Texas Government Code 2252.908 Contract Reporting Form	1-22-2019	

3. Performance, Payment, Maintenance, and Surface Correction Bonds.
4. General Conditions of the Contract.
5. Supplemental Conditions, if any.
6. Specifications 00 00 01 through 01 78 39 and 32 90 00, prepared by Aaron K. Schindewolf, P.E., and sealed on May 8, 2019, Specification 03 09 00, prepared by Sina Arjmand, P.E. and sealed on May 8, 2019, and Specifications 26 05 00 through 26 41 19, prepared by Wade Hubble, P.E. and sealed on May 7, 2019.
7. Drawings.
8. Addenda:

Addendum No.	Addendum Date	Signature Acknowledging Receipt

9. CONTRACTOR'S Proposal Form pursuant to Competitive Sealed Proposal No. 19-0055.
10. Prevailing Wage Rates.
11. The following which may be delivered or issued after the Effective Date of the Agreement and are not attached thereto: All written Change Orders or Change Directives pursuant to Article 3.3 of the General Conditions.

There are no Contract Documents other than those listed in this Article. The Contract Documents may only be amended, modified, or supplemented as provided in Article 3.3 of the General Conditions.

Article 8. INDEMNITY PROVISIONS.

THE GENERAL, SPECIAL, AND SUPPLEMENTAL CONDITIONS, IF ANY, INCORPORATED INTO THIS AGREEMENT CONTAIN PROVISIONS THAT MAY RELIEVE ONE PARTY FOR RESPONSIBILITY IT WOULD OTHERWISE HAVE

UNDER THE LAW FOR DAMAGES OR OTHER LIABILITY ARISING OUT OF THE WORK.

EACH OF THE PARTIES HERETO SPECIFICALLY AGREES THAT IT HAS A DUTY TO READ THIS AGREEMENT, THE GENERAL, SPECIAL, AND SUPPLEMENTAL CONDITIONS, IF ANY, AND ALL OTHER CONTRACT DOCUMENTS AND AGREES THAT IT IS CHARGED WITH NOTICE AND KNOWLEDGE OF THE TERMS OF THIS AGREEMENT AND ALL CONTRACT DOCUMENTS; THAT IT HAS IN FACT READ THIS AGREEMENT AND ALL CONTRACT DOCUMENTS AND IS FULLY INFORMED AND HAS FULL NOTICE AND KNOWLEDGE OF THE TERMS, CONDITIONS AND EFFECTS OF THIS AGREEMENT; THAT IT HAS HAD THE OPPORTUNITY TO BE REPRESENTED BY INDEPENDENT LEGAL COUNSEL OF ITS CHOICE PRECEDING ITS EXECUTION OF THIS AGREEMENT AND HAS RECEIVED OR VOLUNTARILY CHOSEN NOT TO RECEIVE THE ADVICE OF ITS ATTORNEY IN ENTERING INTO THIS AGREEMENT; AND THAT IT RECOGNIZES THAT CERTAIN TERMS OF THIS AGREEMENT AND THE CONTRACT DOCUMENTS RESULT IN ONE PARTY ASSUMING THE LIABILITY INHERENT IN SOME ASPECTS OF THE TRANSACTION AND RELIEVING THE OTHER PARTY OF ITS RESPONSIBILITY FOR SUCH LIABILITY. EACH PARTY HERETO AGREES AND COVENANTS THAT IT WILL NOT CONTEST THE VALIDITY OR ENFORCEMENT OF ANY EXCULPATORY PROVISION OF THIS AGREEMENT ON THE BASIS THAT THE PARTY HAD NO NOTICE OR KNOWLEDGE OF SUCH PROVISION OR THAT THE PROVISION IS NOT "CONSPICUOUS".

Article 9. MISCELLANEOUS.

Terms used in this Agreement which are defined in Article 1 of the General Conditions will have the meanings indicated in the General Conditions.

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 Article 9:

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 proposal process or in the Contract execution;
2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the proposal process or the execution of the Contract to the detriment of OWNER, (b) to establish Proposal or Contract prices at artificial noncompetitive 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 Proposers, with or without the knowledge of OWNER, a purpose of which is to establish Proposal 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 proposal process or affect the execution of the Contract.

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

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

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

This Agreement may be executed in counterparts, each of which shall be deemed an original, but all of which together shall be deemed to be one and the same agreement. A signed copy of this Agreement delivered by facsimile, email, or other means of electronic transmission shall be deemed to have the same legal effect as delivery of an original signed copy of this Agreement. Duplicate copies of duly executed and delivered counterparts of this Agreement shall be deemed to have the same full force and effect as originals and may be relied upon as such. Notwithstanding the foregoing, OWNER and CONTRACTOR agree that this Agreement may be executed using electronic signatures at the option and in the discretion of OWNER, and, in such event, the provisions of the Uniform Electronic Transaction Act, Chapter 332, Texas Business and Commerce Code, as amended, and any applicable policies and procedures of OWNER regarding electronic signatures shall apply.

IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed this Agreement.

This Agreement will be effective on _____, (which is the effective date of the Agreement).

OWNER: San Jacinto River Authority

By: _____

Attest: _____

Address for giving notices:

CONTRACTOR:

By: _____

(CORPORATE SEAL)

Attest: _____

Address for giving notices:

License No. _____

Agent for service of process: _____

END OF SECTION

VERIFICATION COMPANY DOES NOT BOYCOTT ISRAEL

BEFORE ME, the undersigned authority, on this day personally appeared _____ [name], _____ [title] of _____ [Contractor], and, upon oath, after first being duly sworn, deposed and stated:

"My name is _____ and I am the _____ [title] of _____ [Contractor], hereinafter referred to in this verification as 'Contractor'. The facts set forth herein are within my personal knowledge and are true and correct, and I am competent and authorized to make this verification on behalf of Contractor.

Contractor does not Boycott Israel; and

Contractor will not Boycott Israel during the term of this Agreement; and

'Boycott Israel' as used herein means refusing to deal with, terminating business activities with, or otherwise taking any action that is intended to penalize, inflict economic harm on, or limit commercial relations specifically with Israel, or with a person or entity doing business in Israel or in an Israeli-controlled territory, but does not include an action made for ordinary business purposes."

Contractor: _____

By: _____

[Signature of Affiant]

Printed Name: _____

Title: _____

SUBSCRIBED AND SWORN TO before me on this ____ day of _____, 201_, by _____ [title] of _____ [Contractor], known to me or proved through photo identification.

Notary Public in and for the State of Texas

My commission expires: _____

TGC 2252.152 CERTIFICATION FORM

CONTRACTS WITH COMPANIES ENGAGED IN BUSINESS WITH IRAN, SUDAN, OR FOREIGN TERRORIST ORGANIZATIONS PROHIBITED - CERTIFICATION

I, _____, the undersigned
representative of _____
(Company or business name) being an adult over the age of eighteen (18) years of age,
pursuant to Texas Government Code, Chapter 2252, Section 2252.152 and Section
2252.153, certify that the company named above is not listed on the website of the
Comptroller of the State of Texas concerning the listing of companies that are identified
under Section 806.051, Section 807.051 or Section 2253.153. I further certify that should
the above-named company enter into a contract that is on said listing of companies on
the website of the Comptroller of the State of Texas which do business with Iran, Sudan
or any Foreign Terrorist Organization, I will immediately notify the San Jacinto River
Authority's Purchasing Division.

Name of Company Representative (Print)

Signature of Company Representative

Date

VENDOR INFORMATION FORM



San Jacinto River Authority
General & Administrative
1577 Dam Site Road
Conroe, TX 77304

VENDOR INFORMATION FORM

Company Name: _____

PO MAILING / PHYSICAL ADDRESS

ACCOUNTS RECEIVABLE ADDRESS

_____	_____
_____	_____
_____	_____

**Contact
Name:** _____

**A/R Contact
Name:** _____

Title: _____

A/R Telephone: _____

Telephone: _____
**Emergency/
After Hrs #:** _____

A/R Fax: _____

Fax: _____

Accepts Procurement Card: Yes ☐ No ☐

E-Mail: _____

Web Site: _____

NATURE OF BUSINESS

Wholesale Dealer	Sales	<input type="checkbox"/> Manufacturer	Service (repairs, etc.)
Construction	Factory Rep.	Retail Dealer	Professional Services
Govt. Agency			

Please notify the San Jacinto River Authority Purchasing Department immediately of any changes, such as company name, address, telephone number, fax number, email address or change in insurance.

I have reviewed and understand the Insurance Requirements (if applicable) as listed on the following page.

Signature

Please attach a completed W-9 Form and return it with this Vendor Information Form.

Form W-9 (Rev. December 2014) Department of the Treasury Internal Revenue Service	Request for Taxpayer Identification Number and Certification	Give Form to the requester. Do not send to the IRS.																																													
Print or type See Specific instructions on page 2.	1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.																																														
	2 Business name/disregarded entity name, if different from above																																														
	3 Check appropriate box for federal tax classification; check only one of the following seven boxes: <div style="display: flex; justify-content: space-between;"><div><input type="checkbox"/> Individual/sole proprietor or single-member LLC <input type="checkbox"/> Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) + _____ <small>Note. For a single-member LLC that is disregarded, do not check LLC; check the appropriate box in the line above for the tax classification of the single-member owner.</small> <input type="checkbox"/> Other (see instructions) + _____</div><div><input type="checkbox"/> C Corporation <input type="checkbox"/> S Corporation <input type="checkbox"/> Partnership <input type="checkbox"/> Trust/estate</div></div>																																														
	4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3): Exempt payee code (if any) _____ Exemption from FATCA reporting code (if any) _____ <small>(Applies to accounts maintained outside the U.S.)</small>																																														
	6 Address (number, street, and apt. or suite no.) 8 City, state, and ZIP code 7 List account number(s) here (optional)	Requester's name and address (optional)																																													
Part I Taxpayer Identification Number (TIN) Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see <i>How to get a TIN</i> on page 3. <small>Note. If the account is in more than one name, see the instructions for line 1 and the chart on page 4 for guidelines on whose number to enter.</small>																																															
<table border="1" style="width: 100%; border-collapse: collapse;"><tr><td colspan="9" style="text-align: center;">Social security number</td></tr><tr><td style="width: 20%;"> </td><td style="width: 20%;"> </td><td style="width: 20%;"> </td><td style="width: 20%;"> </td><td style="width: 20%;"> </td><td style="width: 20%;"> </td><td style="width: 20%;"> </td><td style="width: 20%;"> </td><td style="width: 20%;"> </td></tr><tr><td colspan="9" style="text-align: center;">OR</td></tr><tr><td colspan="9" style="text-align: center;">Employer identification number</td></tr><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table>			Social security number																		OR									Employer identification number																	
Social security number																																															
OR																																															
Employer identification number																																															
Part II Certification Under penalties of perjury, I certify that: 1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and 2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and 3. I am a U.S. citizen or other U.S. person (defined below); and 4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct. Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 3.																																															
<table border="1" style="width: 100%; border-collapse: collapse;"><tr><td style="width: 20%;">Sign Here</td><td style="width: 60%;">Signature of U.S. person + _____</td><td style="width: 20%;">Date + _____</td></tr></table>			Sign Here	Signature of U.S. person + _____	Date + _____																																										
Sign Here	Signature of U.S. person + _____	Date + _____																																													
General Instructions Section references are to the Internal Revenue Code unless otherwise noted. Future developments. Information about developments affecting Form W-9 (such as legislation enacted after we release it) is at www.irs.gov/w9 . Purpose of Form An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following: <ul style="list-style-type: none">Form 1099-INT (interest earned or paid)Form 1099-DIV (dividends, including those from stocks or mutual funds)Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)Form 1099-S (proceeds from real estate transactions)Form 1099-K (merchant card and third party network transactions) <ul style="list-style-type: none">Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)Form 1099-C (canceled debt)Form 1099-A (acquisition or abandonment of secured property) <p>Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.</p> <p>If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See <i>What is backup withholding?</i> on page 2.</p> <p>By signing the filed-out form, you:</p> <ol style="list-style-type: none">1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued).2. Certify that you are not subject to backup withholding, or3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See <i>What is FATCA reporting?</i> on page 2 for further information.																																															
Cat. No. 10231X Form W-9 (Rev. 12-2014)																																															

SECTION 00 60 20

MONTHLY SUBCONTRACTOR PAYMENT REPORTING FORM

Legal Project Name: _____

SJRA Project No.: _____

Contractor's Company Name: _____

Address: _____

CERTIFICATION

BEFORE ME, the undersigned authority, on this day personally appeared _____,
_____ [title] of _____ [Contractor], and, upon oath, after first being duly
sworn, deposed and stated:

"My name is _____ and I am the _____ [title] of
_____ [Contractor], hereinafter referred to in this affidavit as "Contractor". The facts set
forth herein are within my personal knowledge and are true and correct, and I am competent and authorized to
make this affidavit on behalf of Contractor.

Contractor has paid each and all of its Subcontractors, laborers, suppliers, vendors and
materialmen, if any, in full, for all work, labor, materials, equipment and/or services provided to Contractor
for incorporation in or use or work on the Project, through the period ending _____ *[end date
of last paid pay period]* (the "Pay Period"), except to the extent of any contractual retainage withheld by
Contractor, or other amounts withheld by Contractor for defective work or otherwise in accordance with its
contract with any Subcontractor, laborer, supplier, vendor or materialman and identified in the Payment
Notifications described below.

Contractor acknowledges that SJRA is relying on Contractor's statements and representations
herein in making payment for Work performed on the Project. Contractor agrees to indemnify SJRA from
any and all loss, cost or expense, including but not limited to attorneys' fees incurred, resulting from any
false or incorrect information contained in this affidavit."

EXCEPTION: Contractor sent Payment Notifications to the following Subcontractors, laborers, suppliers,
vendors or materialmen explaining why Contractor withheld payment, copies of which are attached:

Name: _____	Name: _____
-------------	-------------

Street Address: _____	Street Address: _____
-----------------------	-----------------------

City, State, and Zip Code: _____	City, State, and Zip Code: _____
----------------------------------	----------------------------------

Amount of Payment Withheld: _____	Amount of Payment Withheld: _____
-----------------------------------	-----------------------------------

Date Payment First Withheld:

Date Payment First Withheld:

Description of Good Faith

Description of Good Faith

Reason:

Reason:

(Signature of Contractor's Representative)

(Print or Type Name of Contractor's Representative)

SWORN TO AND SUBSCRIBED before me on:

Date

Notary Public in and for the State of Texas

My Commission Expires: _____
Expiration Date

Print or Type name of Notary Public

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4839-5211-5282, v. 1

SECTION 00 61 13.13

PERFORMANCE BOND

STATE OF TEXAS

COUNTY OF _____

KNOW ALL MEN BY THESE PRESENTS: That _____ (Contractor) of the City of _____, County of _____, and State of Texas, as Principal, and _____ authorized under the Laws of the State of Texas to act as surety on bonds for principals, as Surety, are held and firmly bound unto San Jacinto River Authority (Owner), in the penal sum of _____ Dollars (\$_____) for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, by these presents:

WHEREAS, the Principal has entered into a certain written contract with the Owner, dated the _____ day of _____, 20____, for construction of: _____ (the "Contract"), which Contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall faithfully perform said Contract and shall in all respects duly and faithfully observe and perform all and singular the covenants, conditions and agreements in and by said Contract agreed and covenanted by the Principal to be observed and performed, within the time provided therein and any extensions thereof that may be granted by the Owner, and during the life of any guarantees or warranties contained in or required under said Contract, and shall also well and truly perform all the undertakings, covenants, terms, conditions and agreements of any and all modifications of said Contract that may hereafter be made, then this obligation shall be void; otherwise to remain in full force and effect;

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

Surety, for value received, stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract, or to work performed thereunder, or the plans, specifications, or drawings, accompanying the same, shall in anyway affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract, or the work to be performed thereunder.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument on the _____ day of _____, 20__.

Principal

BY:_____

TITLE:_____

ADDRESS:

Surety

BY:_____

TITLE:_____

PHYSICAL ADDRESS:

MAILING ADDRESS FOR NOTICE OF
CLAIMS:

TELEPHONE:_____

LOCAL RECORDING AGENT
PERSONAL IDENTIFICATION
NUMBER:

The name and address of the Resident Agent of Surety is:

END OF SECTION

SECTION 00 61 13.16
STATUTORY PAYMENT BOND

STATE OF TEXAS

COUNTY OF _____

KNOW ALL MEN BY THESE PRESENTS: That _____ (Contractor)
of the City of _____, County of _____, and State
of Texas, as Principal, and _____
authorized under the Laws of the State of Texas to act as surety on bonds for principals,
as Surety, are held and firmly bound unto San Jacinto River Authority (Owner), in the
penal sum of _____ Dollars
(\$ _____) for the payment whereof, the said Principal and Surety bind
themselves, and their heirs, administrators, executors, successors and assigns, jointly
and severally, by these presents:

WHEREAS, the Principal has entered into a certain written contract with the Owner,
dated the _____ day of _____, 20____, for construction of: _____

(the "Contract").

which Contract is hereby referred to and make a part hereof as fully and to the same
extent as if copied at length herein.

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION IS SUCH, that if the
said Principal shall pay all claimants supplying labor and material to him or a Sub-
Contractor in the prosecution of the work provided for in said Contract, then, this
obligation shall be void; otherwise to remain in full force and effect;

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

Surety, for value received, stipulates and agrees that no change, extension of time,
alteration or addition to the terms of the Contract, or to work performed thereunder, or
the plans, specifications, or drawings, accompanying the same, shall in anyway affect
its obligation on this bond, and it does hereby waive notice of any such change,
extension of time, alteration or addition to the terms of the Contract, or the work to be
performed thereunder.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument on the _____ day of _____, 20__.

Principal

Surety

BY:_____

BY:_____

TITLE:_____

TITLE:_____

ADDRESS:_____

PHYSICAL ADDRESS:_____

MAILING ADDRESS FOR NOTICE OF
CLAIM:

TELEPHONE:_____

LOCAL RECORDING AGENT
PERSONAL IDENTIFICATION
NUMBER:

The name and address of the Resident Agent of Surety is:

END OF SECTION

4825-7140-3858, v. 1

SECTION 00 61 19

ONE-YEAR MAINTENANCE BOND

THAT WE, _____,
_____, as Principal, hereinafter called Contractor, and the other
subscriber hereto, _____,
as Surety, do hereby acknowledge ourselves to be held and firmly bound to the San
Jacinto River Authority ("SJRA") in the sum of \$ _____,
_____ , for the payment of which sum to be made to the SJRA
and its successors, Contractor and Surety do bind themselves, their successors, jointly
and severally.

THE CONDITIONS OF THIS OBLIGATION ARE SUCH THAT:

WHEREAS, the Contractor has on or about this day executed a Contract in writing
with the SJRA for _____,
all of such work to be done as set out in full in said Contract Documents therein referred
to and adopted by the SJRA, all of which are made a part of this instrument as fully and
completely as if set out in full herein.

NOW THEREFORE, if the said Contractor shall comply with the provisions of
Paragraph 13.7.1 of the General Conditions, and correct work not in accordance with the
Contract documents discovered within the established one-year period, then this
obligation shall become null and void, and shall be of no further force and effect;
otherwise, the same is to remain in full force and effect.

Notices required or permitted hereunder shall be in writing and shall be deemed
delivered when given in accordance with the definition of Written Notice in the General
Conditions of the Contract.

IN WITNESS THEREOF, the said Contractor and Surety have signed and sealed
this instrument on the respective dates written below their signatures and Surety has
attached its current Power of Attorney.

ATTEST, SEAL: (if a corporation)

WITNESS: (if not a corporation)

By: _____

Name:

Title:

Name of Contractor

By: _____

Name:

Title:

Date:

ATTEST/SURETY WITNESS:

Full Name of Surety

(SEAL)

Address of Surety for Notice

Telephone Number of Surety

By: _____

Name:

Title:

Date:

By: _____

Name:

Title: Attorney-in-Fact

Date:

END OF SECTION

4843-6617-2242, V. 1

SECTION 00 62 04

HISTORY OF OSHA ACTIONS AND LIST OF ON-THE-JOB INJURIES

Prior to award of the Contract, Successful Offeror will be required to file the following with the San Jacinto River Authority:

1. A history of all OSHA actions, advisories, etc., Contractor has received on all jobs worked in any capacity, prime or subcontractor. The history shall be for the two-year period preceding the Bid Date of the Project.
2. A list of all on-the-job injuries, accidents, and fatalities suffered by any present or former employees of Contractor during the same two-year period.
3. If less than the two-year period, give the date Contractor started doing business.
4. Provide the company Experience Modification Rate (EMR) for the three-year period preceding the Proposal Submission Date of the Project.

An officer of the company must certify in a notarized statement that the information submitted is true and correct.

END OF SECTION

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SECTION 00 62 07

**CERTIFICATION REGARDING DEBARMENT,
SUSPENSION, AND OTHER RESPONSIBILITY MATTERS**

Contractor certifies to the best of its knowledge and belief that it and its principals:

1. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal, State, or local department or agency;
2. Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction: violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
3. Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph 2 of this certification; and
4. Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

I understand that a false statement on this certification may be grounds for rejection of this proposal or termination of the award.

Company:

Typed Name & Title of Authorized Representative

Signature of Authorized Representative

Date

☐ I am unable to certify the above statements. My explanation is attached.

END OF SECTION

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SECTION 00 62 10

NAME AND QUALIFICATIONS OF PROPOSED SUPERINTENDENT (FOR FILING)

Prior to award of the Contract, Offeror selected will be required to file the following with the San Jacinto River Authority:

1. The name and qualifications of the Superintendent being proposed to supervise the Project.

This information must be submitted to the SJRA within the time period stated in within 10 days of written notification of contract award. An officer of the company must certify in a statement that the information submitted is true and correct.

END OF SECTION

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SECTION 00 62 16
AFFIDAVIT OF INSURANCE

BEFORE ME, the undersigned authority, on this day personally appeared

_____,
Affiant
who being by me duly sworn on his oath stated that he/she is _____
Title
of _____,
Contractor's Company Name

the Contractor named and referred to within the Contract Documents; that he/she is fully competent and authorized to give this affidavit on behalf of Contractor, and that the attached original insurance certificate truly and accurately reflects the insurance coverage that is now in effect and will be in effect during the periods required by the Contract.

Affiant's Signature
SWORN AND SUBSCRIBED before me on _____
Date

Notary Public in and for the State of TEXAS

Print or type Notary Public name

My Commission Expires: _____
Expiration Date

END OF SECTION

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4827-0155-8354, V. 1

**SECTION 00 65 16
CERTIFICATE OF SUBSTANTIAL COMPLETION**

Date of Substantial Completion:		
Project Name:		Project Number:
Project Location:		Contract Number:
Contractor:		Notice To Proceed Date:
Engineer / Architect:		Contracted Amount:
Construction Manager:		Amount at Completion:
Inspector:		Time to Complete: Days
Punch List Correction Period:	Days	Date of Inspection:

Description of Substantially Complete Work:
<p>Issuance and execution of this Certificate of Substantial Completion by the San Jacinto River Authority (SJRA), shall denote that the described Work for the referenced Project has been inspected for compliance to the Project's Contract Documents and the described Work was found to be Substantially Complete. Therefore, the Date of Substantial Completion is established as indicated above.</p> <p>Items having no impact on the intended and proper implementation, operation, or utilization of the described Work which have been determined as requiring correction or incomplete, are documented on the attached Substantial Completion Punch List. All such items shall be completed within the above stated Punch List Correction Period.</p> <p>Punch List omissions of Contract Work does not relieve the Contractor of its responsibility to complete the Project Work in accordance with the Contract Documents.</p> <p>Contract required warranties and guarantee periods shall commence on the Date of Substantial Completion.</p> <p>Final insurance(s) shall remain in effect until the Project's Date of Final Completion of the Work is established.</p>

Construction Manager:	_____	Date: _____
	Print Signature	
Company:	_____	
Principal Arch./Engineer:	_____	Date: _____
	Print Signature	
Company:	_____	
Contractor:	_____	Date: _____
	Print Signature	
Company:	_____	
SJRA Division Manager:	_____	Date: _____
	Print Signature	
SJRA Deputy General Manager:	_____	Date: _____
	Print Signature	

PREPARATION DATE:

PRINTED		SIGNATURE	
CONTRACTOR (ACKNOWLEDGE RECEIPT):			<div style="display: flex; justify-content: space-between;"> <div>DATE:</div> <div></div> </div>
PRINTED		SIGNATURE	

[illegible]

WWTF No. 2 Generator Replacement
SJRA Project No. WDPR0101.1003.2N001

CERTIFICATION OF SUBSTANTIAL COMPLETION

[illegible]

- End of Punch List -

SECTION 00 65 16.23

CERTIFICATE OF PARTIAL SUBSTANTIAL COMPLETION

		Date of Partial Substantial	
Project Name:		Project Number:	
Project Location:		Contract Number:	
Contractor:		Notice To Proceed Date:	
Engineer / Architect:		Contracted Amount:	
Construction Manager:		Amount at Completion:	
Inspector:		Time to Complete:	Days
Punch List Correction Period:	Days	Date of Inspection:	

Description of Substantially Complete Work:

Issuance and execution of this Certificate of Partial Substantial Completion by the San Jacinto River Authority (SJRA), shall denote that the described Work for the referenced Project has been inspected for compliance to the Project's Contract Documents and the described Work was found to be Substantially Complete. Therefore, the Date of Partial Substantial Completion is established as indicated above.

Items having no impact on the intended and proper implementation, operation, or utilization of the described Work which have been determined as requiring correction or incomplete, are documented on the attached Partial Substantial Completion Punch List. All such items shall be completed within the above stated Punch List Correction Period.

Punch List omissions of Contract Work does not relieve the Contractor of its responsibility to complete the Project Work in accordance with the Contract Documents.

Contract required warranties and guarantee periods shall commence on the Date of Partial Substantial Completion.

Final insurance(s) shall remain in effect until the Project's Date of Final Completion of the Work is established.

Construction Manager:		Date:	
	Print	Signature	
Company:			
Principal Arch./Engineer:		Date:	
	Print	Signature	
Company:			
Contractor:		Date:	
	Print	Signature	
Company:			
SJRA Division Manager:		Date:	
	Print	Signature	
SJRA Deputy General Manager		Date:	
	Print	Signature	

PARTIAL SUBSTANTIAL COMPLETION INSPECTION PUNCH LIST			
			PREPARATION DATE:
PROJECT NAME:		PROJECT NUMBER:	
PROJECT LOCATION:		PREPARED BY:	
CONTRACTOR:		INSPECTION DATE:	
WORK PORTION:			
INSPECTION ATTENDEES:			
NAME	COMPANY	E-MAIL	TELEPHONE
SJRA FIELD REPRESENTATIVE:			DATE:

PRINTED	SIGNATURE		
CONTRACTOR (ACKNOWLEDGE RECEIPT):		DATE:	
PRINTED	SIGNATURE		

PARTIAL SUBSTANTIAL COMPLETION INSPECTION PUNCH LIST		
DESCRIPTION:	DATE COMPLETE:	SIGNED BY:
		PREPARATION DATE:

- End of Punch List -

SECTION 00 65 19

CONTRACTOR'S CERTIFICATION OF FINAL COMPLETION

CERTIFICATE OF FINAL COMPLETION OF: [Legal Project Name]

Project No.: []

Contract Dated: [Contract Date]

BEFORE ME, the undersigned authority, a Notary Public in and for the State of Texas, on this day personally appeared _____ who, being by me duly sworn, on his oath says that he or she represents _____, the Contractor who has performed a contract with the San Jacinto River Authority ("SJRA") for the construction of the Work described above, and is duly authorized to make this affidavit; that he or she has personally examined the Work described above as required by the Contract documents; that said Work and all items thereof have been completed and all known defects made good; that all surplus material, refuse, dirt and rubbish have been cleaned up and removed or disposed of as directed by the SJRA; that all parts of Work are in a neat, tidy, finished condition and ready in all respects for acceptance by the SJRA; that all gravel or shell roadway surfaces removed during the course of the Work have been replaced in accordance with the Specifications, that rates of pay for all labor employed on said Work have not been below the minimum set out in "Labor Classification and Minimum Wage Scale" in the Contract documents and that within the knowledge of affiant all just bills for labor and material and for the rental or use of any equipment or apparatus, used in, on, or in connection with the Work have been paid in full by the Contractor.

Affiant's Signature

SWORN AND SUBSCRIBED before me on
PART 1 -

DATE

Notary Public in and for the State of TEXAS

Print or type name

My Commission Expires: _____
Expiration Date

THIS IS TO CERTIFY that I have thoroughly inspected the Work performed by the above named Contractor on the above described Contract and find all things in accordance with the Contract documents governing this Work.

Inspector

[Project Manager or Construction Manager]

Approved:

[Title of Approval Authority], [Contracting Department]

END OF SECTION

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SECTION 00 65 19.13
AFFIDAVIT OF BILLS PAID

STATE OF TEXAS

COUNTY OF _____

BEFORE ME, the undersigned authority, on this day personally appeared _____, party to that certain Contract entered into on the ____ day of _____, 20__, between **San Jacinto River Authority** (Owner) and _____ for the erection, construction, and completion of certain improvements and/or additions upon the following described premises, to wit:

WASTEWATER TREATMENT FACILITY NO. 2 GENERATOR REPLACEMENT
CSP NO. 19-0055

Said party being by me duly sworn states upon oath that the said improvements have been erected and completed in full compliance with the above referred to Contract and the agreed plans and specifications therefore.

Deponent further states that he has paid all bills and claims for materials furnished and labor performed on said Contract and that there are no outstanding unpaid bills or legal claims for labor performed or materials furnished upon said job.

This affidavit is being made by the undersigned realizing that it is in reliance upon the truthfulness of the statements contained therein that final and full settlement of the balance due on said Contract is being made, and in consideration of the disbursement of funds San Jacinto River Authority, deponent expressly waives and releases all liens, claims and rights to assert a lien on said premises and agrees to indemnify and hold Owner safe and harmless from and against all losses, damages, costs and expenses of any character whatsoever specifically including court costs, bonding fees and attorney fees, arising out of or in any way relating to claims for unpaid labor or material used or associated with construction of improvements on the above-described premises.

By: _____

Subscribed and sworn to before me, the undersigned authority, on this the _____ day of _____, 20__.

Notary Public in and for _____ County, Texas.

END OF SECTION

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SECTION 00 65 19.23

CERTIFICATE OF FINAL COMPLETION

		Date of Final Completion:	
Project Name:		Project Number:	
Project Location:		Contract Number:	
Contractor:		Notice To Proceed Date:	
Engineer / Architect:		Contracted Amount:	
Construction Manager:		Amount at Completion:	
Inspector:		Time to Complete:	Days
Punch List Correction Period:	Days	Date of Inspection:	

Description of Finally Complete Work:

--

Issuance and execution of this Certificate of Final Completion by the San Jacinto River Authority (SJRA), shall denote that the described Work of the referenced Project have been inspected for compliance to the Project's contract documents and are Finally Complete. The date of Final Completion is therefore established as indicated above.

SJRA Deputy General Manager signature indicates final acceptance of the Work and responsibility for the security, maintenance, damage to the Works, and insurance except for those items as provided by the Contract Documents (i.e., extended warranties).

Punch List omissions of Contract Work does not relieve the Contractor of its responsibility to complete the Project Work in accordance with the Contract Documents.

Construction Manager:			Date:	
	Print	Signature		
Company:				
Principal Arch./Engineer:			Date:	
	Print	Signature		
Company:				
Contractor:			Date:	
	Print	Signature		
Company:				
SJRA Division Manager:			Date:	
	Print	Signature		
SJRA Deputy General Manager:			Date:	
	Print	Signature		

CONTRACTOR (ACKNOWLEDGE RECEIPT):		DATE:
-----------------------------------	--	-------

[illegible]

[illegible]

- End of Punch List -

SECTION 00 65 21

CONDITIONAL WAIVER AND RELEASE UPON PROGRESS PAYMENT

Legal Project Name: _____

SJRA Project No.: _____

Contractor's Company Name ("Contractor"): _____

Address: _____

On receipt by Contractor of a check from the San Jacinto River Authority ("SJRA") in the sum of \$_____ payable to Contractor, and when the check has been properly endorsed and has been paid by the bank on which it is drawn, this document becomes effective to waive and release any and all rights, claims and causes of action which Contractor may have against SJRA, including but not limited to any and all claims for costs, expenses and damages incurred by Contractor, arising out of or related to all labor, materials, equipment and/or services furnished for incorporation in or use or work on the Project, through the period ending _____ [end date of current pay period] (the "Pay Period"), except to the extent of any contractual retainage withheld from Contractor, and except for the following pending claims, if any:

Description of Claim

Amount (\$)

Contractor warrants that Contractor has already paid or will use the funds received from this progress payment to promptly pay in full all amounts due the Contractor's laborers, Subcontractors, materialmen, vendors and suppliers for all work, materials, equipment, and/or services provided for or to the above referenced Project through the Pay Period.

Date _____

_____ (Contractor name)

By: _____ (Signature)

_____ (Title)

This instrument was executed and acknowledged before me on this ____ day of _____, 20__, by _____, known to me as the person whose name is subscribed above, as _____ [title] of _____ [company], on behalf of and as the authorized act of said entity.

Notary Public in and for the State of Texas

My Commission Expires: _____

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SECTION 00 65 27

CONDITIONAL WAIVER AND RELEASE UPON FINAL PAYMENT

Legal Project Name: _____

SJRA Project No.: _____

Contractor's Company Name ("Contractor"): _____

Address: _____

On receipt by Contractor of a check from the San Jacinto River Authority ("SJRA") in the sum of \$_____ payable to Contractor, and when the check has been properly endorsed and has been paid by the bank on which it is drawn, this document becomes effective to waive and release any and all rights, claims and causes of action which Contractor may have against SJRA, including but not limited to any and all claims for costs, expenses and damages incurred by Contractor, arising out of or related to all labor, materials, equipment and/or services furnished for incorporation in or use or work on the Project, except for the following pending claims, if any:

Description of Claim

Amount (\$)

Contractor warrants that Contractor has already paid or will use the funds received from this payment to promptly pay in full all amounts due the Contractor's laborers, Subcontractors, materialmen, vendors and suppliers for all work, materials, equipment, and/or services provided for or to the above referenced Project.

Date _____

_____ (Contractor name)

By: _____ (Signature)

_____ (Title)

This instrument was executed and acknowledged before me on this ____ day of _____, 20__, by _____, known to me as the person whose name is subscribed above, as _____ [title] of _____ [company], on behalf of and as the authorized act of said entity.

Notary Public in and for the State of Texas

My Commission Expires: _____

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**Section 00 72 00
GENERAL CONDITIONS OF THE CONTRACT**

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ARTICLE 1 – DEFINITIONS

UNLESS OTHERWISE STATED IN THE CONTRACT DOCUMENTS, WORDS WHICH HAVE WELL-KNOWN TECHNICAL OR CONSTRUCTION INDUSTRY MEANINGS ARE USED IN THE CONTRACT DOCUMENTS IN ACCORDANCE WITH SUCH RECOGNIZED MEANINGS.

Whenever used in these General Conditions or in the other Contract Documents the following terms have the meanings indicated which are applicable to both the singular and plural thereof:

- 1.001 Addendum:** Written instruments issued by the Contract Awarding Authority which clarify, correct or change the bidding requirements or the Contract Documents prior to the Due Date. "Addenda" is the plural form of Addendum.
- 1.002 Agreement:** Document signed by the Parties and binding the Parties, containing the name of Contractor, title and location of the Project, original Contract Time Requirements, Original Contract Amount, enumeration of documents included in the Contract and other provisions.
- 1.003 Allowance:** A not-to-exceed amount which is established between the Owner and the Contractor as part of the Contractor's Bid/Proposal when the precise scope of a particular line item has not been defined to a level which is adequate for the Contractor to provide definitive line item pricing for that particular scope of Work. The use of any Allowances by the Contractor in any Bid/Proposal will be subject to the Owner's sole approval. Additional Allowances or adjustments can be added to any Bid/Proposal upon the agreement of the Owner and Contractor.
- 1.004 Alternative Dispute Resolution:** The process by which a disputed Claim may be settled if the Owner and the Contractor cannot reach an agreement between themselves, as an alternative to litigation.
- 1.005 Application for Payment:** Is the Contractor's monthly pay application, the form of which must be acceptable to the Owner.
- 1.006 Bid/Proposal:** A complete, properly signed response to an Invitation for Bid/Proposal that, if accepted, would bind the Bidder/Offeror to perform the resultant Contract.
- 1.007 Bidder/Offeror:** A person, firm, or entity that submits a Bid/Proposal in response to an Invitation for Bids/Proposals. Any Bidder/Offeror may be represented by an agent after submitting evidence reasonably satisfactory to Owner demonstrating the agent's authority to bind the Bidder/Offeror. The agent cannot certify as to his own agency status.
- 1.008 Bid/Proposal Documents:** The Advertisement or Invitation for Bids/Proposals, Instructions to Bidders/Offerors, the Bid/Proposal Form, the Contract Documents and Addenda.
- 1.009 Bonds:** Performance Bond, Payment Bond, Maintenance Bond, and other Surety instruments executed by Surety. When in singular form the term refers to an individual instrument.
- 1.010 Calendar Day:** Any day of the week; no days being excepted. Work on Saturdays, Sundays, and/or Legal Holidays shall be as approved by and coordinated with Owner.
- 1.011 Change Directive:** A written directive to Contractor, signed by Owner, ordering a change in the Work that is within the general scope of the Contract and consisting of additions, deletions, or other revisions and stating a proposed basis for adjustment, if any, in the Contract Amount or Contract Time Requirements, or both. A Change Directive may be used in the absence of total agreement on the terms of a Change Order. A Change Directive can change the Contract Amount or Contract Time Requirements, and the parties may reasonably expect that the

- change directed or documented by a Change Directive will be incorporated in a subsequently issued Change Order.
- 1.012 Change Orders:** Written agreements entered into between Contractor and Owner authorizing an addition, deletion, or revision to the Contract, issued on or after the Execution Date of the Contract.
- 1.013 CMT Consultant:** Owner's consultant responsible for the testing of construction materials engineering, and the verification testing services necessary for acceptance of the Work by the Owner as required by Section 2267.058(a) of the Texas Government Code.
- 1.014 Claim:** A written demand or written assertion by the Owner or the Contractor seeking, as a matter of right, an adjustment or interpretation of Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract. The Party making the Claim has the responsibility to substantiate the Claim.
- 1.015 Commissioning:** This is the process of verification, preliminary testing, starting up and functional operations testing of all equipment and systems which are part of the Project. The term "commissioning" shall specifically include the drafting, review and verification of all test plans and test reports for all equipment and systems which are part of the Project.
- 1.016 Construction Documents:** Means the Plans or Drawings and the Specifications and such other documents incorporated into the Contract Documents that set out the Contractor's scope of work to be performed under the Contract and/or the technical requirements for the design and construction of the Work.
- 1.017 Contractor:** Means the individual, firm, corporation, or other business entity identified as such in the Agreement, including its successors and its authorized representatives, with whom Owner has entered into the Contract for performance of the Work. The Contractor may also be referred to as the "Bidder" or "Offeror" in the Contract Documents, both of which will be understood to mean the "Contractor" as identified in the Agreement.
- 1.018 Construction Phase:** Means the implementation and execution of the Work required by the Contract Documents, commencing with the Notice to Proceed for the Work.
- 1.019 Contract:** The binding legal agreement between the Owner and the Contractor including all documents that have been incorporated into the agreement between Owner and Contractor for performance of the Work, as evidenced by the Contract Documents, and into which these General Conditions of the Contract (General Conditions) have been incorporated.
- 1.020 Contract Amount:** The monetary amount stated in the Agreement as it may be adjusted by Change Order or Change Directive, payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents.
- 1.021 Contract Awarding Authority:** The SJRA Board of Directors. When authorized by the SJRA Board of Directors, the SJRA General Manager may enter into Contracts on behalf of the SJRA.
- 1.022 Contract Documents:** Those items so designated in the Agreement. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of physical subsurface, geotechnical or environmental conditions are not Contract Documents.
- 1.023 Contract Time Requirements:** Means those requirements for the timely performance of the Work as set forth in the Agreement, including Milestones and the required dates for Mechanical Completion, Substantial Completion and Final Completion.
- 1.024 Cost of the Work:** Has the meaning set forth in Article 11.5.

- 1.025 Critical Path:** The longest series of tasks that runs consecutively from the beginning to the end of the Work, as determined by duration and workflow sequence. This longest path determines how quickly the Work can be completed, given appropriate resources.
- 1.026 Day:** Means that twenty-four hour period measured from midnight to the next midnight. When any period is referred to in days, it will be computed to exclude the first and include the last day of such period.
- 1.027 Defective:** Means with respect to any Work, failing to conform in any respect to any one or more requirements of the Contract Documents.
- 1.028 Delay:** Means a delay, disruption, hindrance, interference, acceleration, recovery effort, or loss of productivity or efficiency, or any other impact whatsoever with respect to the Critical Path of the Work.
- 1.029 Discrepancies:** Means any error, omission, conflict, inconsistency, discrepancy, or lack of clarity in the Contract Documents discovered by the Contractor or that should reasonably have been discovered by the Contractor in fulfilling its obligations arising from the Contract and based upon its applicable standard of care as a Contractor and not as a design professional. The Discrepancy must be determinable by the Contractor through an evaluation of one or more drawings or specifications which are part of the Construction Documents, the above-grade Site conditions, geotechnical reports, surveys or other information provided to Contractor by Owner or any combination thereof.
- 1.030 Division 01:** Means the General Requirements (Division One) of the Specifications made a part of the Construction Documents, whether such Specifications are set out in a separate document or are part of the Project Manual.
- 1.031 Document Control:** This is the process of generating, transmitting, receiving, recording, filing and distributing documents and records generated by the Project Team Members and others during the execution of the Project. The process may utilize an electronic or paper format, or both.
- 1.032 Drawings:** Those portions of the Contract Documents which are graphic and pictorial representations of the scope, extent and character of the Work to be furnished and performed by Contractor and which have been approved by Owner. Drawings may include plans, elevations, sections, details, schedules and diagrams. Shop Drawings are not Drawings.
- 1.033 Due Date:** The date and time specified for receipt of Bids/Proposals or any other required submittal from the Contractor.
- 1.034 Equal:** The terms "equal" or "approved equal" shall have the same meaning.
- 1.035 Execution Date:** Date of last signature of the parties to the Agreement.
- 1.036 Field Order:** A written authorization by the Owner for a minor variation in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Amount or Contract Time Requirements and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
- 1.037 Final Completion:** The point in time when Owner determines that all Work has been completed and the Contract fully performed except for those obligations that survive final payment.
- 1.038 Force Account:** A basis of payment for the direct performance of Work with payment based on the Cost of the Work and consideration for overhead and profit, as set forth in Section 11.5.
- 1.039 Force Majeure:** For purposes of this Contract, events of "force majeure" shall consist of the following, to the extent that they are beyond the reasonable control of Contractor and also cause Delay to the Critical Path of the Project: acts of God, acts of war, terrorist acts, civil unrest, riots, labor disputes (excluding

disputes with laborers on the Project), unavoidable material shortages, fire or other casualty loss (not attributable to the acts or omissions of Contractor or any Subcontractor of any tier), newly announced or enacted governmental restrictions, or acts or inactions of governmental agencies other than the Owner and outside of the Owner's responsibility and control.

1.040 Hazardous Conditions: Are any materials, wastes, substances, and chemicals deemed to be hazardous under applicable Legal Requirements or the handling, storage, remediation, or disposal of which are regulated by applicable Legal Requirements.

1.041 Not used.

1.042 Legal Requirements: Are all applicable federal, state, and local laws, codes, ordinances, rules, regulations, orders, and decrees of any governmental or quasi-governmental entity having jurisdiction over the Project or Site, the practices involved in the Project or Site or any Work.

1.043 Legal Holidays:

.1 The following are recognized by the Owner:

<u>Holiday Observed</u>	<u>Date</u>
New Year's Day	January 1
Martin Luther King Day	Third Monday in January
Presidents' Day	Third Monday in February
Memorial Day	Last Monday in May
Independence Day	July 4
Labor Day	First Monday in September
Veterans Day	November 11
Thanksgiving Day	Fourth Thursday in November
Friday after Thanksgiving	Friday after Thanksgiving
Christmas Eve	December 24
Christmas Day	December 25

.2 If a Legal Holiday falls on Saturday, it will be observed on the preceding Friday. If a Legal Holiday falls on Sunday, it will be observed on the following Monday.

1.044 Major Subcontractor: Means a Subcontractor of the Contractor whose Subcontract amount with the Contractor exceeds or is reasonably expected to exceed the sum of \$50,000.00.

1.045 Manufacturer: An individual or entity who produces goods, materials, or equipment for use or sale and has a direct contract with Contractor or Supplier or any Subcontractor or Sub-Subcontractor to furnish materials or equipment to be incorporated in the Work.

1.046 Master Project Schedule: Is the most recent version of the Contractor's Project Schedule which has been formally accepted by the Owner.

1.047 Mechanical Completion: Means when the specified Work has been delivered, constructed, installed, and Contractor has successfully completed all required local functional testing, obtained Manufacturers' certificates of proper installation, and completed operations readiness testing such that all improvements and equipment are ready for performance testing.

1.048 Milestones: Means a significant event specified in the Owner's Project Schedule or the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

1.049 Modification: Means a written amendment to the Contract, including but not limited to (1) a Change Order, or (2) a Change Directive.

- 1.050 Notice to Proceed:** A Written Notice given by Owner to Contractor fixing the date on which the Contract Time Requirements will commence to run by establishing Date of Commencement of the Work covered by the Written Notice and on which Contractor shall start to perform Contractor's obligations under the Contract Documents for such Work.
- 1.051 Owner:** The San Jacinto River Authority (the "SJRA" or the "Owner"), a public entity, organized and existing under the laws of the State of Texas, acting through the SJRA Board of Directors, the SJRA General Manager or his/her designee, officers, agents or employees to administer design and construction of the Project.
- 1.052 Owner's Independent Contractor:** A contractor who has been employed separately by the Owner and is not a Subcontractor of the Contractor.
- 1.053 Owner's Project Schedule:** Means the dates indicated in the Instructions to Bidders/Offerors and all Contract Time Requirements.
- 1.054 Owner's Representative:** The designated representative or representatives of the Owner. Owner's Representative may be designated from the Owner's staff, the Principal Architect/Engineer, an Owner's Independent Contractor(s), or an Owner's consultant(s) employed for the purpose of representing the Owner on a given Project or Projects.
- 1.055 Partial Occupancy or Use:** Use by Owner of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work, provided Owner and Contractor have, with respect to such part of the Work, accepted in writing the responsibilities assigned to each of them for payments, retainage if any, security, maintenance, utilities, corrective work, insurance and warranties.
- 1.056 Pre-construction Conference:** Is the required meeting between the Owner and the Contractor before Work can be initiated in the field. Contractor will have made all of the required submittals prior to the date of the Pre-construction Conference in accordance with Section 2.4.2.
- 1.057 Preliminary Project Schedule:** Is the initial Contractor's Schedule for the Work required under Section 2.4.2 and must conform to and be integrated with the Milestones contained in the Owner's Project Schedule for the Work and is subject to Owner's approval.
- 1.058 Principal Architect/Engineer (Engineer):** The Owner's design professional identified as such in the Contract. The terms "Principal Architect/Engineer" and "Engineer", as indicated with initial capital letters, mean the same entity, as defined in the Agreement. References to Principal Architect/Engineer in these General Conditions shall refer to the Owner's Principal Architect/Engineer (Engineer), except as otherwise expressly provided herein. Nothing contained in the Contract Documents shall create any contractual or agency relationship between the respective Principal Architect/Engineer and Contractor. References can be singular or plural and will apply to all of the Principal Architects or Engineers as may be applicable.
- 1.059 Project:** Total construction, of which the Work performed under Contract may be the whole or part, and which may include construction by the Owner or by Owner's Independent Contractors.
- 1.060 Project Manual:** That portion of the Contract Documents which may include the following: introductory information; bidding requirements, Contract forms, Agreement, General Conditions, Supplemental General Conditions; General Requirements; Specifications; Drawings; Project Safety Manual; and Addenda.
- 1.061 Project Schedule:** Is the Contractor's most recent schedule submitted to the Owner.

- 1.062 Project Team:** Means the Owner, the Owner's Representative, the Contractor, the Principal Architect/Engineer, any consultants of the Principal Architect/Engineer designated by the Owner, any Owner's Independent Contractors, and any Owner's consultants employed for the purpose of programming, design, and construction of the Project. The constitution of the Project Team may vary at different stages of the Work. The Project Team will be designated by Owner and may be modified from time to time by Owner.
- 1.063 Not used.**
- 1.064 Recovery Schedule:** Means a short duration schedule implemented to bring the Work back on schedule to achieve the Contract Time Requirements for the Project.
- 1.065 Rental Rate Blue Book:** Is the document published by EquipmentWatch which identifies the rental rates for equipment in the construction industry.
- 1.066 Resident Project Representative:** The authorized representative of the Owner's staff, the Principal Architect/Engineer, or an Owner's consultant who may be assigned to the Site or any part thereof. Not all Projects will utilize a Resident Project Representative.
- 1.067 Schedule of Values:** Is a schedule, prepared and maintained by the Contractor, allocating portions of the Contract Amount to various portions of the Work, including a tabulation of all of the costs of the various Subcontracts and materials which in the aggregate make up the Contract Amount. The Schedule of Values shall be subject to Owner's approval and, after such approval, be used as the basis for reviewing the Contractor's Applications For Payment.
- 1.068 Scope of Work:** Is the entire Work which is included within the Contract for this Project. This term can also be used to describe the subset of Work which is included within a particular Trade Subcontract.
- 1.069 Shop Drawings:** All drawings, diagrams, illustrations, schedules and other data or information which are specifically prepared or assembled for the Work by or for Contractor, subcontractor or supplier and submitted by Contractor as required by the Contract Documents.
- 1.070 Site:** Is the land or premises on which the Project is located.
- 1.071 Specifications:** Those portions of the Contract Documents furnished by Owner through its respective Principal Architects/Engineers consisting of written technical descriptions as applied to the Work, which set forth to Contractor, in detail, the requirements which must be met by all materials, equipment, construction, systems, standards, workmanship, and services as applied to the Work and certain administrative requirements and procedural matters.
- 1.072 Start-Up:** This is the subset of Commissioning at which time the Project equipment and / or systems are placed in full operation in preparation for the operational testing phase of the Project.
- 1.073 Stipulated Sum:** Single lump sum amount stated for the completion of the Work or a portion thereof required by this Contract.
- 1.074 Substantial Completion:** The stage in the progress of the Work when the Work, or designated portion thereof, is sufficiently complete in accordance with the Contract Documents so Owner can occupy or utilize the Work for its intended use, as evidenced by a Certificate of Substantial Completion approved by Owner, as further defined in Article 14.07.
- 1.075 Subcontractor (or Trade Subcontractor):** An individual, firm, corporation, or other business entity having a direct contract with the Contractor for the performance of a portion of the Work under the Contract. A Subcontractor includes a supplier of tools, equipment or materials as well as an individual or entity renting tools or equipment to the Contractor. For purposes of this

- Contract, unless designated otherwise, the term "Subcontractor" shall include all Sub-Subcontractors and Suppliers in contractual privity to the Subcontractor.
- 1.076 Sub-Subcontractor:** An individual, firm, corporation, or other business entity who has a direct or indirect contract with a Subcontractor of any tier to perform a portion of the Work, to furnish tools, equipment or materials, or to rent tools or equipment. For purposes of this Contract, unless designated otherwise, the term "Sub-Subcontractor" shall include all lower tier subcontractors and Suppliers in contractual privity to the Sub-Subcontractor.
- 1.077 Superintendent:** The representative of Contractor authorized in writing to receive and fulfill instructions from the Owner's Representative, and who shall supervise and direct construction of the Work.
- 1.078 Supplemental General Conditions:** The part of the Contract Documents which amends or supplements the General Conditions, but only to the extent provided therein. Not all Projects will utilize Supplemental General Conditions. All General Conditions which are not so amended or supplemented remain in full force and effect.
- 1.079 Supplier:** An individual or entity having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment or products, or services to be incorporated in the Work by Contractor or any Subcontractor.
- 1.080 Surety:** Corporate entity that is bound by one or more Bonds, and is responsible for the completion of the Work, including during the correction period, and for payment of debts incurred by Contractor or Subcontractors for work, services, labor, materials or equipment provided in connection with the Work. Surety shall include any co-surety or reinsurer, as applicable.
- 1.081 Underground Improvements:** Is defined in Section 4.2.3 of these General Conditions.
- 1.082 Unit Price:** An amount stated in the Contract for an individual, measurable item of work, which, when multiplied by actual quantity incorporated into the Work, amounts to full compensation for completion of the item, including work incidental to it.
- 1.083 Unit Price Quantities:** Quantities indicated in the Contract that are approximations made by the Owner for contracting purposes.
- 1.084 Unit Price Work:** Is any Work which is to be executed based upon a Unit Price for that Work which has been agreed upon in advance between the Parties in accordance with Section 11.6 of these General Conditions.
- 1.085 Unusual Inclement Weather:** Is defined in Section 12.2 of these General Conditions.
- 1.086 Value Analysis:** Means the systematic application of recognized techniques by a multi-disciplined team to identify the function of a product or service, establish a worth for that function, generate alternatives through the use of creative thinking, and provide the needed functions to accomplish the original purpose of the Project, reliably, without sacrificing safety, necessary quality, or environmental attributes of the Project.
- 1.087 Work:** The entire completed construction, or the various separately identifiable parts thereof, required to be furnished under the Contract Documents, including all labor, products, equipment, material, supervision, insurance, temporary facilities and services provided by Contractor to fulfill Contractor's obligations. The Work may constitute the whole or a portion of the Project.
- 1.088 Working Day:** Any day of the week, not including Saturdays, Sundays, or Legal Holidays in which conditions under the Contractor's control will permit work for a continuous period of not less than seven (7) hours during Working Hours. Upon agreement with Owner, work on Saturdays, Sundays and/or Legal Holidays may be allowed and will be considered a Working Day.

- 1.089 Working Hours:** Those hours in which the Work shall be performed. Except as otherwise authorized in writing by Owner's, all Work shall be done between 7:00 a.m. and 6:00 p.m. However, emergency work may be done without prior permission as indicated in Section 6.11.07. Night Work may be revoked at any time by Owner if Contractor fails to maintain adequate equipment and supervision for the prosecution and control of the night Work.
- 1.090 Written Notice:** Written communication between Owner and Contractor. Written Notice shall be deemed to have been duly served if delivered in person to Owner's Representative or Contractor's duly authorized representative, or if delivered at or sent by registered or certified mail with proper postage affixed to the attention of Owner's Representative or Contractor's duly authorized representative at the last business address known to the party giving notice, or by facsimile to the facsimile number known to the party giving notice, provided any notice delivered by facsimile after 5:00PM shall be deemed delivered on the next business day.

ARTICLE 2 - PRELIMINARY MATTERS

- 2.1 Delivery of Contract, Bonds, Insurance, etc.:** After written notification to Contractor of anticipated award of Contract, and at least ten (10) days prior to the SJRA Board of Directors Meeting at which a contract award is anticipated, Contractor shall deliver to Owner original, hard copies of the signed Agreement, unsigned Bond forms, required evidence of insurance, including without limitation, all certificates of insurance and endorsements, signed disclosure of interested parties (Form 1295), signed Conflict of interest Questionnaire, and signed and notarized Verification Company Does Not Boycott Israel, as identified in the Bid/Proposal Documents. Within three (3) days of Contractor's receipt of the fully executed Agreement, the Contractor shall deliver the original, hard copy fully executed Bonds to Owner. The requirements of this Section 2.1 apply regardless of whether or not the Agreement is also executed using electronic signatures or transmitted electronically. Any violation of this Section 2.1 by Contractor shall render the Contract voidable by Owner.
- 2.2 Copies of Documents:** Owner shall furnish to Contractor up to ten (10) copies of the Contract Documents unless otherwise specified. Additional copies will be furnished, upon request, at a cost to be specified by the Owner.
- 2.3 Commencement of Contract Time Requirements; Notice to Proceed:** The applicable Contract Time Requirements will begin to run on the day indicated in the Notice to Proceed for the Work covered in such Notice.
- 2.4 Before Starting Construction:**
- 2.4.1** No Work shall be done at the Project Site prior to the Pre-construction Conference without Owner's written approval. Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents to check and verify pertinent figures shown thereon and compare them accurately to all applicable field measurements and conditions and other information known to Contractor and other information made available to Contractor by Owner. Contractor shall promptly report in writing to Owner's Representative any conflict, error, ambiguity or Discrepancy which Contractor may discover and shall obtain a written interpretation or clarification from Owner's Representative before proceeding with any Work affected thereby. Contractor shall be liable to Owner for failure to report any conflict, error, ambiguity or

Discrepancy in the Contract Documents about which Contractor knew or reasonably should have known.

2.4.2 Successful completion of the Work within the applicable Contract Time Requirements is of primary importance. **Time is of the essence to this Contract.** Therefore, the Contractor hereby agrees to submit to the Owner's Representative for review and approval, or acceptance, as appropriate, all information required by this section, including a Preliminary Project Schedule for the Work within thirty (30) days from date of the Owner's issuance of the Notice To Proceed with the Work or at the scheduled Pre-construction Conference, whichever is later. The Owner's Representative will schedule the Pre-construction Conference upon the timely submittal of the required documents, unless the allowable time for providing the required submittals is extended by written mutual agreement. Prior to the date scheduled for the Pre-construction Conference, the Contractor will submit the following to the Owner:

- .01** A proposed Preliminary Project Schedule (the "Preliminary Project Schedule") for the Work developed using the scheduling software authorized in Section 6.03 of the General Conditions, unless otherwise approved by Owner, to confirm that all Work will be completed within the respective Contract Time Requirements. The Preliminary Project Schedule must satisfy the requirements of Section 6.03 of these General Conditions and must be prepared in accordance with Division 01 - Section 01 32 16, Construction Progress Schedules. Such Preliminary Project Schedule shall also conform to the Owner's Project Schedule. This Preliminary Project Schedule must contain sufficient detail to indicate that the Contractor has properly identified required Work elements and tasks, has provided for a sufficient and proper workforce and integration of Subcontractors and Suppliers, has provided sufficient resources and has considered the proper sequencing of the Work required to result in a successful Project that can be completed within the Contract Time Requirements. The Project Schedule and Schedule of Values shall be developed together to permit the Work progress to be accurately reflected in the Contractor's Applications for Payment.
- .02** An organizational chart showing the principals and management personnel who will be involved with the Work, including each one's responsibilities for the Work;
- .03** A complete listing of the Contractor's key employees proposed for the Work. List each one by name and job title, and show length of employment with Contractor.
- .04** Emergency contact telephone numbers for the Project Manager and the project Superintendent.
- .05** A discussion and confirmation of the Contractor's commitment to health, safety and environment by providing a copy of its Health, Safety and Environmental Policies, employee's safety handbook and the safety records for the past three years of Contractor's proposed project manager and Superintendent;
- .06** A preliminary schedule of Shop Drawings and sample submittals;
- .07** A preliminary Schedule of Values for all of the Work, subdivided into component parts in sufficient detail to serve as the basis for progress payments during construction. At a minimum, the schedule of values

shall be broken out by trade and split between materials and labor as commented on and accepted by Owner. Such prices will include overhead and profit applicable to each item of Work;

- .08** A letter designating Contractor's Superintendent and project manager, and a confirmation of past project experience for the Contractor's Superintendent and project manager specifically applicable to the Work;
- .09** A letter designating the "Competent Person(s)" on general safety and excavation safety measures along with certifications or other documentation of the safety representative's qualifications;
- .10** If applicable, an excavation safety system plan;
- .11** If applicable, a plan illustrating proposed locations of temporary facilities;
- .12** A letter designating the Texas Registered Professional Land Surveyor for layout of the Work, if the Work requires the services of a licensed surveyor.

2.4.3 Neither the rejection, acceptance, comment on nor the approval of any of the submittals required in Section 2.4.2, above, will constitute either the adoption, affirmation, or direction of the Contractor's means and methods of the performance of the Work which remain the sole responsibility of the Contractor. Owner shall not be responsible for, and will not have control or charge of, construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, and shall not be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents. Owner shall not be responsible for or have control or charge over the acts or omissions of Contractor, Subcontractors or any of their agents or employees or any other persons performing any of the Work.

2.5 Pre-construction Conference: Prior to commencement of Work at the Site, Contractor must attend a Pre-construction Conference with Owner's Representative and others required by Owner, and participate in an inspection of the Project Site if required by Owner.

2.6 Initially Acceptable Schedules: Unless otherwise provided in the Contract Documents, Contractor shall obtain approval of Owner of the Preliminary Project Schedule submitted in accordance with Section 2.4.2.01 before the first progress payment will be made to Contractor. The Preliminary Project Schedule must provide for an orderly progression of the designated portion of the Work to completion within the Contract Time Requirements, including any specified Milestones, and shall permit the Work progress to be accurately reflected in the Contractor's Applications for Payment. Approval of the Preliminary Project Schedule by Owner will not impose on Owner responsibility or liability for the sequencing, scheduling or progress of the Work, nor shall it constitute interference with, nor shall it relieve Contractor from Contractor's full responsibility for the Work. Contractor's schedule of Shop Drawings and sample submissions shall provide adequate time, in Owner's opinion, for properly reviewing and processing the required submittals. Contractor's Schedule of Values must conform to the requirements set forth in the Contract. The process of approving Preliminary Project Schedule and updates to the Master Project Schedule shall not constitute a warranty by the Owner that any non-Contractor milestones or activities will occur as set out on the Preliminary Project Schedule or the Master Project Schedule, or approval of the logic set out in the Preliminary Project Schedule

or Master Project Schedule. Approval of the Preliminary Project Schedule, the Master Project Schedule or any updates thereto does not constitute a warranty by the Owner to furnish any Owner-furnished information or services any earlier than Owner would otherwise be obligated to furnish that information or services under the Contract Documents. Failure of the Work to proceed in the sequence scheduled by Contractor shall not serve as any basis for a Claim for additional compensation or adjustment of the Contract Time Requirements.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.1 Intent: The intent of the Contract Documents is to include all information necessary for the proper execution and timely completion of the Work by Contractor. The Contractor will execute the Work described in and reasonably inferable from the Contract Documents as necessary to produce the results intended by the Contract Documents.

3.1.1 The Contract Documents are complementary in nature, and what is shown in one location on the Drawings or Specifications shall be construed to apply to all other similar locations of the Drawings and Specifications. In the event of any internal inconsistency in either the Drawings or Specifications, or with each other, the Owner shall resolve such inconsistency and Contractor shall perform in accordance with the Owner's determination. In the determination of the Contract Amount, the Contractor has provided for such further development consistent with the Contract Documents and reasonably inferable therefrom. It is the intent and understanding of Contractor that the Contract Amount includes the construction of completed and tested Work by the Contractor, including all devices, fasteners, materials or other work not shown in the Drawings and Specifications but which are reasonably inferable therefrom and any and all incidental accessories necessary to make the Work complete and operable in all respects (even if not specified in the description of the Work, but necessary for proper installation and operation of the Work under the Drawings and Specifications), all of which shall be included in the Contract Amount.

3.1.2 The expression "reasonably inferable" and similar terms in the Contract Documents shall be interpreted to mean reasonably inferable by a contractor familiar with the Project and exercising the care, skill and diligence of the Contractor required by the Contract Documents. Such further development does not include such things as changes in scope, systems, kinds and quality of materials, finishes or equipment, all of which, if required, shall be incorporated by Change Order or Change Directive. The Contract Documents shall be interpreted with the understanding that a common sense approach will be utilized as necessary so that the Contract Documents produce the intended results for the benefit of the Owner as follows:

- .1** The Contract Documents are intended to be complimentary and interpreted in harmony so as to avoid conflict. Words and phrases will be interpreted in a manner consistent with construction and design industry standards. What is required by any Contract Document shall be required by all of them;
- .2** In the event of any inconsistency, conflict or ambiguity between or among the Contract Documents that cannot be harmonized so as to avoid conflict, the Contract Documents shall take precedence in the

following order: Modifications, documents amending, modifying or supplementing the Contract Documents pursuant to Article 3.3 of the General Conditions, the Agreement, Exhibits to the Agreement, the Supplemental Conditions (if any), the General Conditions, Instructions to Bidders/Offerors, Notice to Proceed, Addenda, Specifications, Drawings, Contractor's Bid/Proposal, Documentation submitted by Contractor prior to Notice of Award and attached to the Agreement, Performance, Payment and Maintenance Bonds; and

- .3** The definitions of terms herein shall apply equally to the singular and plural forms of the terms defined. Whenever the context may require, any pronoun shall include the corresponding masculine, feminine and neuter forms. The words "include", "includes" and "including" shall be deemed to be followed by the phrase "without limitation". Unless the context requires otherwise (a) any definition of or reference to any agreement, instrument or other document herein shall be construed as referring to such agreement, instrument or other document as from time to time amended, supplemented or otherwise modified (subject to any restrictions on such amendments, supplements or modifications set forth herein), (b) any reference herein to any Party shall be construed to include such Party's successors and assigns (subject to the restrictions contained herein), and (c) the words "herein", "hereof" and "hereunder", and words of similar import, shall be construed to refer to the entirety of the Contract Documents and not to any particular provision, unless the context clearly dictates otherwise. No provision of this Agreement shall be interpreted or construed against any Party because such Party or its legal representative drafted such provision.

3.1.3 Standards, Specifications, Codes, Laws, and Regulations

- .1** Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Legal Requirements, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Legal Requirements in effect at the time of opening of Bids/Proposals (or on the Effective Date of the Agreement if there were no Bids/Proposals) and as amended, modified, codified or reenacted, in whole or in part, and in effect from time to time, except as may be otherwise specifically stated in the Contract Documents.
- .2** No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, or the Principal Architect/Engineer, or any of their related entities any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.2 Reporting and Resolving Discrepancies: If, during the performance of the Work, Contractor discovers any Discrepancy within the Contract Documents or

between the Contract Documents and any provisions of any Legal Requirements or of any such standard, specification, manual or code or instructions of any Supplier, Contractor shall report it to Owner's Representative in writing at once, and Contractor shall not proceed with the Work affected thereby until a clarification, an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Section 3.3.1 or Section 3.3.2 below. Contractor shall be liable to Owner for failure to report any such Discrepancy that Contractor knew about or should reasonably have discovered in fulfilling its obligations arising from the Contract.

3.3 Clarifying, Amending and Supplementing Contract Documents:

3.3.1 The Contract Documents may be amended to provide for additions, deletions and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways:

- .1** Change Order.
- .2** Change Directive.

3.3.2 In addition, the requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work that do not affect the Contract Amount or Contract Time Requirements may be authorized, in one or more of the following ways:

- .1** Field Order.
- .2** Shop Drawing or sample approved in accordance with the Contract Documents.
- .3** Written interpretation or clarification issued in accordance with the Contract Documents.

3.4 Reuse of Documents Prohibited: Contractor and any Subcontractor or Supplier or other person or organization performing or furnishing any of the Work under a direct or indirect contract with Owner: (i) shall not have or acquire any title to or ownership rights in any of the Drawings, Specifications or other documents (or copies of any thereof) prepared by or bearing the seal of Principal Architect/Engineer or Principal Architect/Engineer's consultant, and (ii) shall not reuse any of such Drawings, Specifications, other documents or copies on extensions of the Project or any other project without written consent of Owner and Principal Architect/Engineer. Contractor may retain one (1) set of such documents for its records.

3.5 Not Used.

3.6 Electronic Data: Owner utilizes Microsoft SharePoint or similar document management software (the "Program") for its projects. Contractor will be provided access to the Program solely for purposes of Contractor's performance of its obligations under the Contract, at no cost to Contractor. The Program may be used to handle management, distribution and submission of all Project documents (including without limitation drawings, specifications, submittals, RFIs, schedules, etc.). Contractor must access the Program for all such Project documents, unless otherwise directed in writing by Owner. Contractor is responsible for all of the content contained in the Program related to the Project, including but not limited to all periodic updates, revisions and additions to the Project documents contained therein. All Project documents contained in the Program shall be deemed delivered to Contractor. Contractor is responsible for ensuring and maintaining compatibility of

Contractor's computer systems with the Program. Contractor shall take all necessary precautions to prevent any unauthorized access to the Program and the Project documents contained therein, and to prevent any virus or malware infiltration of the Program. **CONTRACTOR SHALL COMPLY WITH ALL MICROSOFT OR OTHER SIMILAR DOCUMENT MANAGEMENT SOFTWARE VENDOR TERMS AND CONDITIONS APPLICABLE TO CONTRACTOR'S USE OF THE PROGRAM, AND SHALL DEFEND, INDEMNIFY AND HOLD HARMLESS OWNER FROM AND AGAINST ANY AND ALL CLAIMS, DAMAGES, LIABILITY, LOSS, COST AND EXPENSE, INCLUDING BUT NOT LIMITED TO ATTORNEYS' FEES, INCURRED AS A RESULT OF ANY CONTRACTOR BREACH OF SUCH TERMS AND CONDITIONS (COLLECTIVELY "CLAIMS" AS USED IN THIS SECTION 3.6), EVEN IF SUCH CLAIMS ARE CAUSED IN PART BY, BUT NOT TO THE EXTENT CAUSED BY, THE NEGLIGENCE OR FAULT, THE BREACH OR VIOLATION OF A STATUTE, ORDINANCE, GOVERNMENTAL REGULATION, STANDARD, OR RULE, OR THE BREACH OF CONTRACT OF OWNER, ITS AGENT OR EMPLOYEE, OR ANY THIRD PARTY UNDER THE CONTROL OR SUPERVISION OF OWNER, OTHER THAN CONTRACTOR OR ITS AGENT, EMPLOYEE OR SUBCONTRACTOR OF ANY TIER.** Any use, interpretation, conclusion or information obtained or derived from such Program information and documents will be at the user's sole risk. If there is a conflict or inconsistency between the Program information or documents and any hard copies furnished to Contractor, Contractor shall promptly notify Owner and Principal Architect/Engineer in writing, and shall not rely upon such Program information or documents or the hard copies furnished to Contractor until such conflict or inconsistency is resolved in writing by Owner or Principal Architect/Engineer. When distributing documents in electronic media format, Owner makes no representations as to compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those which are used by Owner or the data's creator.

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

4.1 Availability of Lands: The Owner will provide access to all land and interests in land required for the Work and will notify Contractor of any known restrictions in such access. Contractor may make a Claim if, after having received seventy-two hours' prior written notice, the Owner fails to provide timely access to the Work. Contractor is solely responsible for and must obtain any additional temporary construction facilities, stockpiling or storage sites not otherwise provided by the Owner.

4.1.1 In the event that Owner has agreed to provide any special licenses or easement(s) relating to the Work and in the event that Delays in the Work that are the responsibility of the Contractor cause the Work to be Delayed to the point that the ending date of such a license or easement has been exceeded, the Contractor shall reimburse the Owner for any additional costs and/or expenses incurred by Owner (including but not limited to reasonable attorneys' fees) in endeavoring to extend or renew the duration of any such license or easement in order to facilitate the completion of the Work.

4.2 Subsurface and Physical Conditions:

- 4.2.1** Contractor specifically represents that it has carefully examined the plans, the geotechnical report, if any, and the Site of the proposed Work and is thoroughly familiar with all of the conditions surrounding construction of the Project, having had the opportunity to conduct any and all additional inquiry, tests and investigation that he/she deems necessary and proper, to satisfy itself as to conditions, including but not limited to subsurface conditions, at the Site of the Work, and to inform itself by its independent research, tests and investigations of the difficulties to be encountered and to judge for itself the accessibility of the Work and all attending circumstances affecting the cost of doing the Work or time required for its completion. Contractor acknowledges the receipt of the geotechnical report, if any, and agrees that the report is not a guarantee of specific Site conditions which may vary between boring locations and over time, and is not a Contract Document. Contractor may not rely upon or make any Claim against Owner with respect to any Contractor interpretation of or conclusion drawn from any data, interpretations, opinions or information contained in such reports or shown or indicated in such drawings. Contractor shall make no claims against the Owner and shall bear all risk of losses, if any, resulting on account of the amount and character of the Work, or because the conditions under which the Work must be done vary or differ from conditions or information contained in the Contract Documents, or are different from what were estimated or anticipated by it.
- 4.2.2** Except as provided in Section 4.2.5 below, Contractor must notify Owner in writing as soon as reasonably possible, but no later than three (3) calendar days, if unforeseen conditions are encountered at the Site which are (i) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or other information provided by Owner to Contractor or (ii) unknown physical conditions of an unusual nature, that differ materially from those normally encountered in the type of Work being performed under this Contract. Contractor may not disturb the conditions until Owner conducts an investigation of such conditions. Upon receipt of notice from the Contractor, the Owner's Representative will promptly investigate such conditions with the Principal Architect/Engineer.
- 4.2.3** Notwithstanding any other provision of this Contract, Contractor is solely responsible for the location and protection of any and all underground utilities, pipelines, facilities and improvements, whether public or private, and whether utility_distribution, supply or collection systems, or lines connecting customers to utility distribution, supply or collection systems, and including but not limited to all electric, telecommunication, gas, water, storm sewer and sanitary sewer lines, and all pipes, conduits, cables, wires, manholes, vaults, tanks, and tunnels (collectively "Underground Improvements"). Contractor shall notify "One Call" and shall retain a private underground locator service, and shall exercise due care to locate, mark, uncover and otherwise protect all Underground Improvements in the construction zone and any of Contractor's Work or storage areas. Contractor's responsibility for the location and protection of Underground Improvements is primary and non-delegable. **Contractor shall defend and indemnify Owner from and against any losses, Claims, expenses, costs or penalties (including fines that may be levied against Owner) that may result from damage to any Underground Improvements in the Work area.** Owner reserves the right to repair any damage Contractor causes to such Underground Improvements

at Contractor's expense or to offset the cost of such repairs against funds then or thereafter due Contractor pursuant to the Contract. If any Underground Improvements are damaged by Contractor, Contractor shall give verbal notice to the Owner's Representative within one (1) hour and written notice within twenty-four (24) hours after such damage occurs.

4.2.4 Contractor shall take reasonable precaution to avoid disturbing primitive records and antiquities of archaeological, paleontological or historical significance. No objects of this nature shall be disturbed without written permission of Owner and Archeology Division, Texas Historical Commission. When such objects are uncovered unexpectedly, Contractor shall stop all Work in close proximity and immediately notify the Owner's Representative and Archeology Division, Texas Historical Commission of their presence. Contractor shall reference Texas Water Development Board Emergency Conditions for cultural resources in the event of accidental discoveries. Contractor shall not disturb them until written permission and permit to do so is granted by the governing authorities and Owner. All primitive rights to antiquities uncovered on Owner's property shall remain property of State of Texas, Archeology Division, Texas Historical Commission in accordance with the Texas Natural Resources Code. If it is determined by Owner, in consultation with Archeology Division, Texas Historical Commission, that exploration or excavation of primitive records or antiquities on Project Site is necessary to avoid loss, Contractor shall cooperate in salvage work attendant to preservation. If the Work stoppage or salvage work causes an increase in Contractor's cost of, or time required for, performance of the Work, the Contract Amount and/or Contract Time Requirements will be equitably adjusted.

4.2.5 Environmental Conditions: Contractor shall immediately stop all Work and must notify Owner in writing as soon as reasonably possible, but no later than one (1) calendar day after any significant environmental conditions are encountered at the Site which are or may be subject to any Legal Requirements. Contractor shall reference Texas Water Development Board Emergency Conditions for threatened and endangered species in the event of accidental discoveries. Contractor shall not disturb the conditions until Owner conducts an investigation. Owner's Representative and Principal Architect/Engineer will promptly investigate such conditions. If it is determined that such conditions are subject to Legal Requirements, did not result from any Hazardous Conditions brought to the Site by Contractor or any Subcontractor, and cause an increase or decrease in the Contractor's cost of or time required for performance of any part of the Work, Owner's Representative will recommend an equitable adjustment in the Contract Amount or Contract Time Requirements, or both. If it is determined that such conditions are not subject to Legal Requirements or resulted from any Hazardous Conditions brought to the Site by Contractor or any Subcontractor, Owner's Representative will notify Contractor in writing of such findings and the Contract Amount and Contract Time Requirements will not be adjusted. Contractor may dispute such a determination in accordance with Article 16.

4.3 Reference Points: Unless otherwise specified, primary control lines and bench marks suitable for use in layout will be furnished by Owner. Lay out of the Work shall be performed in accordance with the requirements of Division 01. Controls, bench marks and property boundary markers shall be carefully preserved by

Contractor by use of flags, staffs or other visible devices and in case of destruction or removal by Contractor, any Subcontractor or their employees, such controls and bench marks shall be replaced by a Texas Registered Professional Land Surveyor at Contractor's expense. Any SJRA survey monuments damaged by Contractor will be reestablished by Owner at Contractor's expense.

4.4 Hazardous Conditions:

4.4.1 Contractor shall not be responsible for any Hazardous Conditions uncovered or revealed at the Site which were not shown, indicated or identified in the Contract Documents to be within the scope of the Work, and which were not brought onto the Site by the Contractor or the Subcontractors. Contractor shall immediately notify Owner's Representative of any such suspected Hazardous Conditions encountered at the Site before or during performance of the Work, and shall stop Work immediately in the affected area, and take all necessary precautions to avoid disturbance of the Hazardous Conditions.

4.4.2 Contractor shall be responsible for any Hazardous Conditions brought to the Site by Contractor, Subcontractor, Suppliers or anyone else for whom Contractor is responsible.

4.4.3 No asbestos-containing materials or lead-based paint shall be incorporated into the Work or brought on the Project Site without prior written approval of Owner. The Contractor shall not knowingly use, specify, request or approve for use any asbestos containing materials or lead-based paint without the Owner's written approval. When a specific product is specified, the Contractor shall endeavor to verify that the product does not include asbestos containing material or lead-based paint.

4.4.4 Refer to Section 1.040 Hazardous Conditions definitions and to Division 01 for procedures related thereto.

- .1** Not used.
- .2** Upon receiving notice of the presence of suspected Hazardous Conditions, Owner shall take the necessary measures required to ensure that the Hazardous Conditions are remediated or rendered harmless. Such necessary measures shall include Owner retaining qualified independent consultants to (i) ascertain whether Hazardous Conditions have actually been encountered, and, if they have been encountered, (ii) prescribe the remedial measures that Owner must take either to remove the Hazardous Conditions or render the Hazardous Conditions harmless.
- .3** Contractor shall be obligated to resume Work at the affected area of the Project only after Owner or its qualified independent consultant provides written certification that (i) the Hazardous Conditions have been removed or rendered harmless and (ii) all necessary approvals have been obtained from all government and quasi-government entities having jurisdiction over the Project or Site. The Contractor shall be responsible for continuing the Work in the unaffected portion of the Project and Site.
- .4** Contractor will be entitled, in accordance with these General Conditions, to an adjustment in its Contract Amount and/or Contract Time Requirements to the extent Contractor's cost of performance is

actually increased and/or the Critical Path of the Work has been delayed by the presence of Hazardous Conditions discovered at the Site.

- .5** Notwithstanding anything in the Contract Documents to the contrary, Owner, its officers, directors, agents and employees, and the Owner's Representative, the Principal Architect/Engineer, the Principal Architect/Engineer's Consultants and Subconsultants and their respective officers, directors, partners, employees and agents are not responsible for Hazardous Conditions introduced to the Site by Contractor, Subcontractors or anyone for whose acts they may be liable. Contractor shall be responsible for use, storage and remediation of any Hazardous Conditions brought to the Site by Contractor, Subcontractors, Suppliers or anyone else for whom Contractor is responsible. **Contractor shall defend, indemnify and hold harmless Owner and Owner's officers, directors, employees and agents and the Owner's Representative, the Principal Architect/Engineer, the Principal Architect/Engineer's Consultants and Subconsultants and their respective officers, directors, partners, employees and agents from and against any and all claims, losses, damages, liabilities and expenses, including attorneys' fees and court costs, arising out of or resulting from Hazardous Conditions introduced to the Site by Contractor, Subcontractors or anyone for whose acts they may be liable. Notwithstanding the foregoing, if Subchapter C of Chapter 151 of the Texas Insurance Code applies to the Contract, the obligation to defend, indemnify and hold harmless set forth in this Section 4.4.4.5 shall not apply to the extent prohibited by Subchapter C of Chapter 151 of the Texas Insurance Code.**

ARTICLE 5 - BONDS AND INSURANCE

- 5.1 Surety and Insurance Companies:** All Bonds and insurance required by the Contract Documents shall be obtained from solvent surety or insurance companies that are duly admitted and licensed by the State of Texas and authorized to issue bonds or insurance policies for the limits and coverages required by the Contract Documents. Bonds shall be in a form acceptable to Owner and shall be issued by a surety which complies with the requirements of Chapter 3503 of the Texas Insurance Code. The Surety must obtain reinsurance for any portion of the risk that exceeds 10% of the Surety's capital and surplus. For bonds exceeding \$100,000, the Surety must also hold a certificate of authority from the U.S. Secretary of the Treasury or have obtained reinsurance from a reinsurer that is authorized as a reinsurer in Texas and holds a certificate of authority from the U.S. Secretary of the Treasury and has an A.M. Best rating of A-, X or better.

5.2 Workers' Compensation Insurance Coverage:

5.2.1 Definitions:

- .1** Certificate of coverage ("certificate") - A copy of a certificate of insurance, a certificate of authority to self-insure issued by the

division, or a coverage agreement (DWC Form-81, DWC Form-82, DWC Form-83, or DWC Form-84), showing statutory workers' compensation insurance coverage for the person's or entity's employees providing services on the Project, for the duration of the Project.

- .2** Duration of the Project - includes the time from the beginning of the Work on the Project until the Contractor's/person's Work on the Project has been completed and accepted by Owner.
- .3** Persons providing services on the Project includes all persons or entities performing all or part of the services the Contractor has undertaken to perform on the Project, regardless of whether that person contracted directly with the Contractor and regardless of whether that person has employees. This includes, without limitation, independent contractors, Subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity which furnishes persons to provide services on the Project.
- .4** Services include, without limitation, providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include activities unrelated to the Project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

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

5.2.3 Contractor must provide a certificate of coverage to Owner prior to being awarded the Contract.

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

5.2.5 Contractor shall obtain from each person providing services on the Project, and provide to Owner:

- .1** A certificate of coverage, prior to that person beginning Work on the Project, so Owner will have on file certificates of coverage showing coverage for all persons providing services on the Project; and
- .2** No later than seven (7) days after receipt by Contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the Duration of the Project.

5.2.6 Contractor shall retain all required certificates of coverage for the Duration of the Project and for one (1) year thereafter.

5.2.7 Contractor shall notify Owner in writing by certified mail or personal delivery, within ten (10) days after Contractor knew or should have known,

of any change that materially affects the provision of coverage of any person providing services on the Project.

- 5.2.8** Contractor shall post on each Project Site a notice, in the text, form and manner prescribed by the Texas Department of Insurance, Division of Workers' Compensation, informing all persons providing services on the Project that they are required to be covered, and stating how a person may verify coverage and report lack of coverage.
- 5.2.9** Contractor shall contractually require each person with whom it contracts to provide services on the Project, to:
- .1** Provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all of its employees providing services on the Project, for the Duration of the Project;
 - .2** Provide to Contractor, prior to that person beginning Work on the Project, a certificate of coverage showing that coverage is being provided for all employees of the person providing services on the Project, for the Duration of the Project;
 - .3** Provide Contractor, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the Duration of the Project;
 - .4** Obtain from each other person with whom it contracts, and provide to Contractor: a) a certificate of coverage, prior to the other person beginning Work on the Project; and b) a new certificate of coverage showing extension of coverage, prior to the end of the coverage period, if the coverage period shown on the current certificate of coverage ends during the Duration of the Project;
 - .5** Retain all required certificates of coverage on file for the Duration of the Project and for one (1) year thereafter;
 - .6** Notify Owner in writing by certified mail or personal delivery, within ten (10) days after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the Project; and
 - .7** Contractually require each person with whom it contracts, to perform as required by these Section 5.2.9.1 through Section 5.2.9.7, with the certificates of coverage to be provided to the person for whom they are providing services.
- 5.2.10** By signing this Contract or providing or causing to be provided a certificate of coverage, Contractor is representing to Owner that all employees of the Contractor who will provide services on the Project will be covered by workers' compensation coverage for the Duration of the Project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the division. Providing false or misleading information may subject Contractor to administrative penalties, criminal penalties, civil penalties or other civil actions.

- 5.2.11** Contractor's failure to comply with any of these provisions is a breach of the Contract by Contractor which entitles Owner to declare the Contract void if Contractor does not remedy the breach within ten (10) days after receipt of notice of breach from Owner.

5.3 Additional Insurance Requirements:

5.3.1 Contractor And Subcontractor Provided Insurance: Contractor and Subcontractors shall obtain and maintain insurance coverages described in Sections 5.3.1.01 through 5.3.1.08 and, to the extent applicable, Sections 5.3.1.09 through 5.3.1.11 through the end of the warranty period (with the exception of Builders' Risk, which is required to remain in effect at least until final payment) or such longer periods of time as may be set forth herein; except that Subcontractors' limits of coverage for Commercial General Liability shall be no less than \$1,000,000 per occurrence and \$2,000,000 in the aggregate, Subcontractors shall not be required to maintain separate Builder's Risk Insurance, Subcontractors shall not be required to maintain Environmental Impairment Liability or Pollution Liability Insurance unless their Scope of Work involves Hazardous Conditions in which event such Subcontractors shall maintain such insurance with limits of coverage not less than \$1,000,000 per occurrence and \$2,000,000 in the aggregate, Subcontractors shall not be required to maintain Professional Liability coverage unless their Scope of Work includes professional services in which event such Subcontractors shall maintain such insurance with limits of coverage not less than \$1,000,000 per occurrence and in the aggregate, and Subcontractors' limits of coverage for Umbrella Liability shall be no less than \$3,000,000. All insurance secured by Contractor, Subcontractors and Sub-Subcontractors pursuant to Owner's requirements under this provision shall be in accordance with Article 5 of the General Conditions and Section 5.3.1.01 as follows.

5.3.1.01 General Requirements.

- .01** Contractor shall carry insurance in the types and amounts indicated below for the Duration of the Project or such longer periods of time set forth below, and shall include coverage for items owned by Owner in the care, custody and control of Contractor prior to and during construction and the warranty period.
- .02** Contractor shall forward Certificates of Insurance evidencing the coverage and limits of insurance required herein to Owner with copies to each additional insured and loss payee listed in the Supplemental Conditions (if any), before the Contract is executed. Contractor shall also provide copies of policy endorsements and excerpts from policies to evidence the required coverages. Contractor shall not commence Work until the required insurance is obtained and until such insurance has been reviewed and approved by Owner. Approval of insurance by Owner shall not relieve or decrease the liability of Contractor hereunder and shall not be construed to be a limitation of liability on the part of Contractor. Contractor must also forward new Certificates of Insurance to Owner whenever a previously identified policy period has expired as verification of continuing coverage.
- .03** Contractor's insurance coverage is to be written by companies licensed to do business in the State of Texas at the time the policies are issued and shall be written by companies with A.M. Best ratings of A-, X or

better, except for pollution liability or environmental impairment liability insurance which shall be written by companies with A.M. Best ratings of A- or better.

- .04** All endorsements naming the Owner as an additional insured, waivers of subrogation in favor of Owner, and notices of cancellation endorsements as well as the Certificates of Insurance shall specify Owner's name and address as: the San Jacinto River Authority, 1577 Dam Site Road, Conroe, Texas 77304.
- .05** The "other" insurance clause shall not apply to the Owner where the Owner is an additional insured shown on any policy. Insurance policies required by the Contract shall be primary and non-contributing with respect to any other insurance coverage maintained by or available to the Owner and/or other additional insureds. The policies shall be endorsed to provide severability of interests.
- .06** If underlying insurance policies are not written with coverage limits for at least the amounts specified below, Contractor shall carry Umbrella or Excess Liability Insurance for any differences in amounts specified. If Excess Liability Insurance is provided, it shall follow the form of the primary coverage and have the same inception and termination dates as the primary coverage.
- .07** Owner shall be entitled, upon request and without expense, to receive certified copies of policies and endorsements thereto and may make any reasonable requests for deletion or revision or modification of particular policy terms, conditions, limitations, or exclusions except where policy provisions are established by law or regulations binding upon either of the parties hereto or the underwriter on any such policies. Failure of Contractor to provide certified copies, as requested, is a material breach of the Contract.
- .08** Owner reserves the right to review the insurance requirements set forth during the effective period of this Contract and to make reasonable adjustments to insurance coverage, limits, and exclusions when deemed necessary and prudent by Owner based upon changes in statutory law, court decisions, the claims history of the industry or financial condition of the insurance company as well as Contractor.
- .09** All insurance policies required to be maintained will contain a provision or endorsement stating that the coverage afforded will not be cancelled until at least 30 days' prior written notice has been provided to the Contractor and to the Owner. Contractor shall not cause any insurance to be canceled nor permit any insurance to lapse during the term of the Contract or as required in the Contract.
- .10** Contractor shall be responsible for premiums, deductibles and self-insured retentions, if any, stated in policies. The amounts of all deductibles or self-insured retentions shall be disclosed on the Certificates of Insurance. Any deductible or self-insured retention in excess of \$25,000 is subject to the written approval of Owner.
- .11** Contractor shall provide Owner thirty (30) days written notice of erosion of the aggregate limits below occurrence limits for all applicable coverages required by the Contract.
- .12** If Owner-owned property is being transported or stored off-site by Contractor, then the appropriate property policy will be endorsed for transit and storage in an amount sufficient to protect Owner's property.

- .13** The insurance coverages required under this contract are required minimums and are not intended to limit the responsibility or liability of Contractor. The inclusion of required minimum insurance limits in this Contract shall not be construed as limiting the Owner's or other additional insured's rights under any policy with higher limits. The minimum insurance limits set forth in this Contract shall be deemed to be amended to any higher limits actually contained in Contractor's insurance policies.
- .14** The Contractor hereby waives its rights of recovery from the Owner, its officers, directors, agents and employees, and the Owner's Representative, the Principal Architect/Engineer, the Principal Architect/Engineer's Consultants and Subconsultants and their respective officers, directors, partners, employees and agents with regard to all causes of property and/or liability loss covered by insurance required by this Contract, and shall cause a waiver of subrogation endorsement to be provided in favor of the Owner, its officers, directors, agents and employees, and the Owner's Representative, the Principal Architect/Engineer, the Principal Architect/Engineer's Consultants and Subconsultants and their respective officers, directors, partners, employees and agents on all insurance coverage carried by the Contractor, whether required herein or not.
- .15** Failure to obtain and maintain the required insurance shall constitute a material breach of, and default under, this Contract. If Contractor shall fail to remedy such breach, Contractor will be liable for any and all costs, liabilities, damages and penalties resulting to Owner from such breach, unless a written waiver of the specific insurance requirement(s) is provided to Contractor by Owner. In the event of any failure by Contractor to comply with the provisions of this Contract, Owner may, without in any way compromising or waiving any right or remedy at law or in equity, on notice to Contractor, purchase such insurance, at Contractor's expense, provided that Owner shall have no obligation to do so and if Owner shall do so, Contractor shall not be relieved of or excused from the obligation to obtain and maintain such insurance amounts and coverages.
- .16** Additional insured status shall be provided in favor of the Owner, its officers, directors, agents and employees, and the Owner's Representative, the Principal Architect/Engineer, the Principal Architect/Engineer's Consultants and Subconsultants and their respective officers, directors, partners, employees and agents on all insurance policies other than Workers' Compensation, Professional Liability and Builder's Risk, on ISO forms CG 20 10 10 01 and CG 20 37 10 01 or their combined equivalent. It is the intent of the parties to this Contract that this Additional Insured status shall include coverage for completed operations and for the additional insureds' concurrent and sole negligence. Notwithstanding the foregoing, if Subchapter C of Chapter 151 of the Texas Insurance Code applies to the Contract, this additional insured obligation shall not require or provide coverage the scope of which is prohibited under Subchapter C of Chapter 151 of the Texas Insurance Code.
- .17** Contractor's obligations under this Contract to defend, indemnify and/or hold harmless Owner or other parties shall not be limited in any way by any insurance required of Contractor by this Contract or otherwise provided or maintained by

Contractor. Any insurance obligations of Contractor under this Contract are independent from Contractor's obligations under this Contract to defend, indemnify and/or hold harmless Owner or other parties.

5.3.1.02 Business Automobile Liability Insurance: Provide coverage for all owned, non-owned and hired vehicles. The policy shall provide coverage in the following types and amounts:

- .1 A minimum combined single limit of \$1,000,000 per occurrence for bodily injury and property damage.
- .2 A minimum combined single limit of \$1,000,000 minimum per occurrence for bodily injury and property damage.
- .3 The policy shall contain the following endorsements in favor of Owner:
 - .a Waiver of Subrogation endorsement; and
 - .b 30 day Notice of Cancellation endorsement; and
 - .c Additional Insured endorsement.

5.3.1.03 Workers' Compensation And Employers' Liability Insurance: Coverage shall meet or exceed statutory limits and all other benefits outlined in the Texas Workers' Compensation Act (Section 401). The minimum policy limits for Employers' Liability Insurance coverage shall be \$500,000 bodily injury per accident, \$500,000 bodily injury by disease policy limit and \$500,000 bodily injury by disease each employee.

- .1 Contractor's policy shall cover all States in which Work is performed and apply to the State of Texas and shall include these endorsements in favor of Owner:
 - .a Waiver of Subrogation; and
 - .b 30 day Notice of Cancellation.

5.3.1.04 Commercial General Liability Insurance: Provide coverages with minimum limits as follows: combined bodily injury and property damage limit of \$2,000,000 minimum per occurrence and \$5,000,000 aggregate. The Contractor's policy shall include coverage for:

- .1 Blanket contractual liability coverage for liability assumed under the Contract and all contracts relative to this Project; and
- .2 Completed Operations/Products Liability for at least three years after Substantial Completion; and
- .3 Explosion, Collapse and Underground (X, C & U) coverage; and
- .4 Independent Contractors coverage; and
- .5 Aggregate limits of insurance per project; and
- .6 Additional insureds as required in 5.3.1.01.16; and
- .7 30 day notice of cancellation in favor of Owner; and
- .8 Waiver of Transfer of Recovery Against Others in favor of all required additional insureds; and
- .9 Primary and non-contributing endorsement.

5.3.1.05 Builder's Risk Insurance: Contractor shall maintain Builder's Risk Insurance or Installation Insurance on an all-risk physical loss form in the Contract Amount plus the value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Work at the site on a replacement cost basis without optional

deductibles. Coverage shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, explosion, tornado, malicious mischief, collapse, earthquake, flood, surface water, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements and shall cover reasonable compensation for Principal Architect/Engineer's and Contractor's services and expenses required as a result of any insured loss. Coverage shall continue until final payment for the Work is made by the Owner. Coverage shall allow for partial occupancy/use by the Owner. Owner shall be an additional named insured on the policy. Policy must include expenses incurred in the repair or replacement of any insured property, including but not limited to fees and charges of the Principal Architect/Engineer and any other engineers and architects and their respective subconsultants. If off-site storage is permitted by the Owner, coverage shall include materials in transit and storage in an amount sufficient to protect property being transported or stored. Any losses covered by the Builder's Risk or Installation Insurance shall be adjusted by the Owner.

5.3.1.06 Environmental Impairment Liability or Pollution Liability Insurance:

Contractor shall comply with the following insurance requirements in addition to those specified above:

- .1 Provide an Environmental Impairment Liability policy with minimum limits of \$2,000,000 each occurrence and \$5,000,000 aggregate. Coverage shall contain a "per project" aggregate, 30 day notice of cancellation to Owner and waiver of subrogation in favor of Owner. Coverage to include non-owned disposal sites. Coverage shall include clean-up costs, bodily injury, property damage and defense costs.
- .2 Policy shall contain proper endorsement wording to comply with Federal or TCEQ requirements. Policy will also cover vessels and marine operations. Contractor shall submit complete copies of the policy providing pollution liability coverage to Owner.

5.3.1.07 Professional Liability Insurance: For Work which requires professional engineering or architectural or professional survey services to meet the requirements of the Contract, including but not limited to excavation safety systems, traffic control plans, and construction surveying, the Contractor or Subcontractors, responsible for performing the professional services shall provide Professional Liability Insurance with a minimum limit of \$1,000,000 each occurrence and \$3,000,000 aggregate to pay on behalf of the assured all sums which the assured shall become legally obligated to pay as damages by reason of any negligent act, error, or omission committed in connection with professional services provided for or in connection with the Work of this Contract.

5.3.1.08 Umbrella Liability: Umbrella Liability with a limit of \$5,000,000, with the Owner as an additional insured and with waiver of subrogation and 30 day notice of cancellation. The Umbrella Liability policy shall follow form, be excess over and be no less broad than all coverages described above (with the exception of Workers' Compensation, Professional

Liability and Pollution Liability), shall include a drop-down provision and contain a per job aggregate. This policy shall have the same inception and expiration dates as the Commercial General Liability insurance required above. Contractor shall maintain such insurance in identical coverage, form and amount, including required endorsements, for at least three (3) years following Date of Substantial Completion of the Work to be performed under the Contract.

5.3.1.09 Protection and Indemnity: Protection and Indemnity coverage for any over water operations, vessels, barges, divers. This policy shall have limits of \$1,000,000 each occurrence, \$2,000,000 aggregate and policy endorsed to provide

5.3.1.10 Excess P&I: Excess P&I in the amount of \$20,000,000 each occurrence with additional insured, waiver of subrogation and 30 day notice of cancellation to the Owner.

5.3.1.11 Marine: Contractor and/or any Subcontractors shall have appropriate workers compensation insurance to provide coverage for USL&H and Jones Act exposures.

5.3.2 Waiver of Rights

5.3.2.1 All policies purchased in accordance with Section 5.3.1.05 shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional named insureds thereunder. Owner and Contractor waive all rights of recovery for damages against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, the Principal Architect/Engineer, the Principal Architect/Engineers Consultants and Subconsultants and Owner's Representative and any named insured or additional named insured or loss payee to the extent (a) of losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work and (b) that such losses and damages are actually paid by such policies or other property insurance applicable to the Work. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as adjuster or recipient thereof or otherwise payable under any such policy.

5.3.3 Receipt and Application of Insurance Proceeds

5.3.3.1 Any insured loss under the policies of insurance required by Section 5.3.1.05 will be adjusted with Owner and made payable to Owner for the named insureds, additional named insureds, and loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Section 5.3.3.2. Owner shall deposit any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof, to the extent of loss payments received, covered by an appropriate Change Order.

5.3.3.2 Owner shall have power to adjust and settle any loss with the builder's risk or other property insurers.

5.3.4 Partial Utilization, Acknowledgment of Property Insurer:

5.3.4.1 If Owner desires to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Section 14.08, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Section 5.3.1.05 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, and the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

5.4 Bonds:

5.4.1 General:

- .1** Contractor shall furnish performance, payment, and one-year maintenance Bonds, each in an amount at least equal to the Contract Amount as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents, as well as a second year maintenance Bond, in an amount equal to ten percent (10%) of the Contract Amount. The one-year maintenance Bond shall remain in effect until completion of the correction period specified in Section 13.7.1. The second year maintenance Bond shall remain in effect until 2-years from the date of Substantial Completion. Contractor shall also furnish such other Bonds as are required by the Contract Documents.
- .2** Bonds shall be executed on forms furnished by Owner, as included in the Specifications. All Bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each Bond.
- .3** If the Surety on any Bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in the State of Texas or it is placed into receivership, Contractor shall within ten (10) days thereafter substitute other Bonds and Surety, each of which must be acceptable to Owner.
- .4** The Performance Bond and Payment Bond shall be issued in an amount of one hundred percent (100%) of the Contract Amount as security for the faithful performance and/or payment of all Contractor's obligations under the Contract Documents. All Bonds, including but not limited to the Performance Bond and Payment Bond shall be issued by a solvent corporate surety company authorized to do business in the State of Texas, and shall meet any other requirements established by law or by Owner pursuant to applicable law. Any surety duly authorized to do business in Texas may write Performance and Payment Bonds on a project without reinsurance to the limit of ten percent (10%) of its capital and surplus. Such a surety must reinsure any obligations over the ten percent (10%) limit.

5.4.2 Performance Bond:

- .1 Contractor shall furnish Owner with a Performance Bond in the form set out in the Contract Documents.
- .2 The Performance Bond shall include the one (1) year warranty correction period obligation from the date of Substantial Completion of the Work.

5.4.3 Payment Bond:

- .1 Contractor shall furnish Owner with a Payment Bond in the form set out in the Contract Documents.

5.4.4 One-Year Maintenance Bond:

- .1 Contractor shall furnish Owner with a One-Year Maintenance Bond in the form set out in the Contract Documents.

5.4.5 Second-Year Maintenance Bond:

- .1 Contractor shall furnish Owner with a Second-Year Maintenance Bond in the form set out in the Contract Documents.
- .2 The Second-Year Maintenance Bond shall be in an amount equal to ten percent (10%) of the Contract Amount, and shall remain in effect until 2-years from the date of Substantial Completion.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.01 Supervision and Superintendence:

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

6.01.2 Contractor shall have an English-speaking, competent Superintendent on the Work at all times that Work is in progress. The Superintendent will be Contractor's representative on the Site and shall have the authority to act on the behalf of Contractor. All communications given to the Superintendent shall be as binding as if given to Contractor. Contractor's Superintendent and Project Manager shall provide cellular telephone numbers and emergency and home telephone number(s) at which one or the other may be reached if necessary when Work is not in progress. Telephone or cellular phone number(s) shall be to a live person having responsible authority for the Work and not an answering machine or answering service. The Superintendent must be an employee of the Contractor, unless such requirement is waived in advance in writing by the Owner. If the Contractor proposes a management structure with a Project Manager supervising, directing, and managing construction of the Work in addition to or in substitution of a Superintendent, the requirements of these

Construction Documents with respect to the Superintendent shall likewise apply to any such Project Manager:

- .1 Contractor shall present the resume of the proposed Superintendent to the Owner's Representative showing evidence of experience and successful superintendence and direction of Work of a similar scale and complexity. If, in the opinion of the Owner, the proposed Superintendent does not have sufficient experience in line with the Work, he/she will not be allowed to be the designated Superintendent for the Work.
- .2 The Superintendent shall not be replaced without prior Written Notice to Owner's Representative. If Contractor deems it necessary to replace the Superintendent, Contractor shall provide the necessary information for approval, as stated above, on the proposed new Superintendent.
- .3 A qualified substitute Superintendent may be designated in the event that the designated Superintendent is temporarily away from the Work, but not to exceed a time limit acceptable to the Owner's Representative.
- .4 Contractor shall replace the Superintendent upon Owner's request in the event the Superintendent is unable to perform to Owner's satisfaction.

6.02 Labor, Materials and Equipment:

6.02.1 Contractor shall maintain a work force adequate to accomplish the Work within the Contract Time Requirements. Contractor agrees to employ only orderly and competent workers, skillful in performance of the type of Work required under this Contract. Contractor, Subcontractors, Sub-Subcontractors, and their employees may not use or possess any alcoholic or other intoxicating beverages, illegal drugs or controlled substances while on the job or on Owner's property, nor may such workers be intoxicated, or under the influence of alcohol or drugs, on the job. Subject to the applicable provisions of Texas law, Contractor, Subcontractors, Sub-Subcontractors, and their employees may not use or possess any firearms or other weapons while on the job or on Owner's property. If Owner or Owner's Representative notifies Contractor that any worker or representative of Contractor is incompetent, disorderly, abusive, or disobedient, has knowingly or repeatedly violated safety regulations, has possessed any firearms in contravention of the applicable provisions of Texas law or this Contract, or has possessed or was under the influence of alcohol or drugs on the job, Contractor shall immediately remove such worker or representative, including any officer or owner of Contractor, from performing Contract Work, and may not employ such worker or representative again on Contract Work without Owner's prior written consent. Contractor shall at all times maintain good discipline and order on or off the Site in all matters pertaining to the Project. Contractor shall pay workers no less than the applicable wage rates established for the Contract, and maintain weekly payroll reports as evidence thereof, in accordance with the requirements of Chapter 2258 of the Texas Government Code.

6.02.2 Except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular Working Days and regular Working Hours.

Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without the Owner's prior written consent given after the Contractor has provided 48-hour advanced written notice to the Owner's Representative.

6.02.3 Unless otherwise specified in Division 01, Contractor shall provide and pay for all 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 furnishing, performance, testing, start-up and completion of the Work, provided the Owner's CMT Consultant shall provide certain inspection services, the Owner shall provide testing of construction materials engineering and the verification testing services necessary for acceptance of the Work by Owner, as required by Section 2267.058(a) of the Texas Government Code.

6.02.4 All materials and equipment shall be of good quality and new (including new products made of recycled materials, pursuant to Section 361.426 of the Texas Health & Safety Code), except as otherwise provided in the Contract Documents. If required by Owner's Representative, Contractor shall furnish satisfactory evidence (reports of required tests, Manufacturer's certificates of compliance with material requirements, mill reports, etc.) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with instructions of the applicable Manufacturer or Supplier, except as otherwise provided in the Contract Documents.

6.02.5 Substitutes and "Approved Equal" Items:

.1 Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Manufacturer or Supplier, the specification or description is intended to establish the type, function and quality required. Unless the specification or description contains words reading that no like, equivalent or "approved equal" item or no substitution is permitted, other items of material or equipment of other Manufacturers or Suppliers may be submitted by Contractor, at Contractor's sole risk, including potential impacts and disruptions to the Critical Path of the Project Schedule, to Principal Architect/Engineer for their review and approval through Owner's Representative under the following circumstances:

(a) "Approved Equal": If in Principal Architect/Engineer's and Owner's sole discretion an item of material or equipment proposed by Contractor is functionally equal and of equivalent type and quality to that named, and sufficiently similar so that no change in related Work, time of performance or Contract Amount will be required, it may be approved by Principal Architect/Engineer and Owner through the submittal process as an "approved equal" item. Contractor shall provide Principal Architect/Engineer and Owner with all necessary documentation required for Principal Architect/Engineer and Owner to make their evaluation, and shall identify the item of material or

equipment proposed by Contractor as a variation in accordance with Section 6.20.5.

- (b) Substitute Items: Contractor may submit an item of material or equipment which does not qualify as an "approved equal" item under Subsection 6.02.5.1(a), or may resubmit an item of material or equipment proposed by Contractor and rejected by Principal Architect/Engineer or Owner as an "approved equal" item under Subsection 6.02.5.1(a), as a proposed substitute item. All of Contractor's requests for substitutions must be clearly identified as a **"Request For Substitution"** on the face of the document. Contractor shall submit sufficient information as provided in Division 01 to allow Principal Architect/Engineer and Owner to evaluate the item of material or equipment proposed as a substitute for the item named.
- .2 Substitute Construction Methods and Procedures: If a specific means, method, technique, sequence or procedure of construction is shown or indicated in and expressly required by the Contract Documents, Contractor may, at Contractor's sole risk, including potential impacts and disruptions to the Critical Path of the Project Schedule, with prior approval of Principal Architect/Engineer, furnish or utilize a substitute means, method, technique, sequence, or procedure of construction. All such proposed substitutions must be clearly identified as being a **"Substitution"** in all of the Contractor's submittals. Contractor shall submit sufficient information to Owner's Representative to allow Principal Architect/Engineer's, in Principal Architect/Engineer's sole discretion, evaluation of the proposed substitute as an equivalent to that method or procedure expressly called for by the Contract Documents. The procedure for review by Principal Architect/Engineer will be same as that provided for substitute items in Division 01.
- .3 Principal Architect/Engineer's Evaluation: Principal Architect/Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Subsections 6.02.5.1(a), 6.02.5.1(b), and 6.02.5.2. Principal Architect/Engineer and Owner will be the judge of acceptability. No "approved equal" or substitute shall be ordered, installed, or utilized until Principal Architect/Engineer's and Owner's review is complete, and any "approved equal" is approved through the submittal process, or any approved substitute is evidenced by either a Change Order, or a Change Directive. Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety Bond with respect to any approved substitute. Owner shall not be responsible for any Delay due to review time for any "approved equal" or substitute.
- .4 Contractor's Expense: All data and documentation to be provided by Contractor in support of any proposed "approved equal" or substitute item will be at Contractor's expense.
- .5 The approval of the Principal Architect/Engineer and/or Owner will not relieve the Contractor from primary responsibility and liability for the suitability and performance of any proposed substitute item, method or procedure and will not relieve Contractor from its primary responsibility and liability for curing Defective Work and performing warranty work, which the Contractor shall cure and perform,

regardless of any claim the Contractor may choose to advance against the Owner, the Principal Architect/Engineer or Manufacturer.

- .6 Notwithstanding the foregoing, it is agreed and understood that the Contract Amount shall not be adjusted as a result of the Contractor's use of the cost of any possible substitute or "approved equal" items in calculating its Bid/Proposal price.

6.02.6 Contractor agrees to assign and hereby assigns to Owner any rights it may have to bring antitrust suits against its Manufacturers or Suppliers for overcharges on materials incorporated in the Project growing out of illegal price fixing agreements. Contractor further agrees to cooperate with Owner should Owner wish to prosecute suits against Manufacturers or Suppliers for illegal price fixing.

6.03 Project Schedule Requirements: Unless otherwise provided in Division 01, Contractor shall adhere to the Owner's Project Schedule as provided by the Owner, which shall be further developed by the Contractor to become first the Contractor's Preliminary Project Schedule and then, upon acceptance by the Owner, become the Master Project Schedule, as it may be adjusted from time to time as provided below:

6.03.1 Preliminary Project Schedule: Within thirty (30) days from the issuance of a Notice To Proceed by the Owner, the Contractor shall submit to the Owner's Representative a Preliminary Project Schedule to be used as the Contractor's baseline schedule for the Project. This Preliminary Project Schedule shall be initially based on and shall include and be consistent with all of the Milestones contained in Division 01, Work Covered By Contract Documents Specification, and shall be presented in a form reasonably acceptable to the Owner. The Preliminary Project Schedule shall be a Critical Path Method (CPM) schedule depicting all significant activities which will occur on the Project; the durations for all major items of Work to be performed; the start and finish dates of such activities; the Contract Time Requirements as set out in the Contract Documents; and the precedence logic of such activities. The Contractor's Preliminary Project Schedule shall include, at a minimum:

- .1 Duration and milestone dates for all equipment, materials delivery, and operations efforts that may affect the timely completion of the Project.
- .2 Duration and milestone dates for each anticipated construction activity.
- .3 Pre-purchase of materials and equipment with a "long lead" time.
- .4 Permitting and regulatory milestones.
- .5 Dates associated with the activities leading to delivery milestones from others including for offsite roadways and utilities.

6.03.2 The Contractor shall coordinate the Preliminary Project Schedule with the Contractor's Submittal Schedules for Shop Drawings and Samples as required by Division 01 of the Project Manual. The Contractor's Submittal Schedule must provide an adequate duration for reviewing and processing the required Submittals acceptable to Owner and the Principal Architect/Engineer.

6.03.3 The Contractor shall provide Owner with an electronic version (by disk or CD) of the Preliminary Project Schedule and of each subsequent Master

Project Schedule, including all subsequent electronic schedule revisions and updates, created without password protection, in latest version of Microsoft Project (.MPT, .MPX or .MPD suffix) or a format approved by Owner. Failure to furnish Owner, Owner's Representative, and Principal Architect/Engineer with a revised Project Schedule in one of the above formats within ten (10) days of receipt of a written request shall constitute a breach of the Contract by Contractor, and shall be considered to be adequate cause for termination of the Contractor by Owner.

6.03.4 Master Project Schedule: Once the Contractor's Preliminary Project Schedule has been accepted by Owner, it shall become the Master Project Schedule (Baseline Schedule) for the Project. The Contractor shall update the Master Project Schedule monthly or more often by the submission of a revised Master Project Schedule or when circumstances develop which make it beneficial to the Project, or as may be required by Owner. Once the most recently revised Master Project Schedule has been accepted by Owner, the Master Project Schedule shall be considered to have been updated. The updated Master Project Schedule shall then be distributed by the Contractor to Owner's staff, the Principal Architect/Engineer, each consultant, and other appropriate parties. The Master Project Schedule shall be reviewed at the monthly team meeting at a summary level, including for a three month look-ahead and anticipated Project completion.

6.03.5 Changes to the Master Project Schedule: A copy of the accepted Master Schedule shall be maintained unaltered. The Contractor shall thereafter submit to Owner's Representative an updated Project Schedule each month with its Application for Payment, to reflect actual progress that has been made and to forecast future progress of the Work. The monthly Project Schedule update shall be based upon the accepted Master Project Schedule. Contractor shall submit to Owner's Representative for review and acceptance by Owner any proposed changes or adjustments in its monthly Project Schedule that modify either the Master Project Schedule or the previous month's approved Project Schedule. Any such proposed adjustments must be substantiated with a written narrative containing an explanation of any changes to the underlying logic of the subject schedule. Contractor's proposed changes to the schedule must show how the Contractor will consistently advance the progress of the Work in accordance with the Critical Path of the Work and the Contract Time Requirements, including all required contractual Milestones. Such adjustments will conform generally to the Master or monthly Project Schedule then in effect and additionally will comply with any provisions of Division 01 applicable thereto.

6.03.6 Proposed adjustments indicated by the Project Schedule that will change the Contract Time Requirements, including Milestones, shall be submitted in accordance with the requirements of Article 12. Any such proposed adjustments must be substantiated with documentation of any changes to the underlying logic of the Master Project Schedule. Such adjustments may only be made by a Change Order or Change Directive in accordance with Article 12.

6.03.7 Contractor shall keep a current schedule of submittals that coordinates with the Master Project Schedule, and shall submit the initial schedule of

submittals to Owner's Representative for acceptance along with the Preliminary Project Schedule.

6.04 Concerning Subcontractors, Suppliers and Others:

6.04.1 Assignment: Contractor shall retain direct control of and give direct attention to the fulfillment of this Contract. Contractor shall not assign, transfer, or convey this Contract or any portion thereof, or any right, title or interest in, to or under same, or any causes of action or claims for damages arising under this Contract or any breach thereof, without the prior written consent of Owner. In addition, without Owner's written consent, the Contractor will not subcontract the performance of the entire Work or the supervision and direction of the Work.

6.04.2 Award of Subcontracts for Portions of the Work: Contractor shall not employ any Subcontractor, Supplier or other person or organization, whether initially or as a substitute, against whom Owner may have reasonable objection. Owner will communicate such objections by Written Notice. If Owner requires a change without good cause of any Subcontractor, person or organization previously accepted by Owner, the Contract Amount shall be increased or decreased by the difference in the cost caused by any such change, and an appropriate Change Order shall be issued. Contractor shall not substitute any Subcontractor, person or organization that has been accepted by Owner, unless the substitute has been accepted in writing by Owner. No acceptance by Owner of any Subcontractor, Supplier or other person or organization shall constitute a waiver of any right of Owner to reject Defective Work. Contractor shall comply with the applicable requirements set forth in the Bid/Proposal Documents and Contract Documents with respect to Subcontractors and the subcontracting process.

6.04.3 Contractor shall enter into written agreements with all Subcontractors and Suppliers which specifically bind the Subcontractors, Manufacturers and Suppliers to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Principal Architect/Engineer. The Owner reserves the right to specify that certain requirements shall be adhered to by all Subcontractors, Manufacturers and Suppliers as indicated in other portions of the Contract Documents and these requirements shall be made a part of the agreements between Contractor and Subcontractors, Manufacturers and Suppliers.

6.04.4 Contractor shall be fully responsible to Owner for all acts and omissions of the Subcontractors, Manufacturers, or Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with Contractor just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents shall create for the benefit of any such Subcontractor, Manufacturer, or Supplier or other person or organization any contractual relationship between Owner and any such Subcontractor, Supplier, Manufacturer or other person or organization, nor shall it create any obligation on the part of Owner or Principal Architect/Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Manufacturer, or Supplier or other

person or organization except as may otherwise be required by laws and regulations.

- 6.04.5** Contractor shall be solely responsible for efficiently scheduling and coordinating the Work of Subcontractors, Manufacturers, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with Contractor in order to avoid any Delays or inefficiencies in the prosecution of the Work. Contractor shall require all Subcontractors, Manufacturers, Suppliers and such other persons and organizations performing or furnishing any of the Work to communicate with Owner's Representative through Contractor.
- 6.04.6** The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing or delineating the Work to be performed by any specific trade.
- 6.04.7** Contractor shall pay each Subcontractor, Manufacturer and Supplier their appropriate share of payments made to Contractor not later than ten (10) Calendar Days from Contractor's receipt of payment from Owner.
- 6.04.8** To the extent allowed by Texas law, the Owner shall be deemed to be a third party beneficiary to each subcontract and may, if Owner elects, following a termination of the Contractor, require that the Subcontractor(s) perform all or a portion of unperformed duties and obligations under its subcontract(s) for the benefit of the Owner, rather than the Contractor; however, if the Owner requires any such performance by a Subcontractor for the Owner's direct benefit, then the Owner shall be bound and obligated to pay such Subcontractor the reasonable value for all Work performed by such Subcontractor to the date of the termination of the Contractor, less previous payments to Contractor for such Subcontractor's work, and for all Work performed by Subcontractor thereafter. In the event that the Owner elects to invoke its right under this section, Owner will provide written notice of such election to the terminated Contractor and the affected Subcontractor(s).

6.05 Patent Fees and Royalties:

- 6.05.1** Contractor shall be responsible at all times for compliance with applicable patents or copyrights encompassing, in whole or in part, any design, device, material, or process utilized, directly or indirectly, in the performance of the Work or the formulation or presentation of its Bid/Proposal.
- 6.05.2** Contractor shall pay all royalties and license fees and shall provide, prior to commencement of Work hereunder and at all times during the performance of same, for lawful use of any design, device, material or process covered by letters patent or copyright, suitable legal agreement with the patentee, copyright holder, or their duly authorized representative, whether or not a particular design, device, material, or process is specified by Owner.
- 6.05.3** Contractor shall defend Owner in all suits or claims for infringement of any patent or copyright and shall indemnify and save Owner harmless from any loss or liability, direct or indirect, arising with respect to Contractor's process in the formulation of its Bid/Proposal or the performance of the

Work or otherwise arising in connection therewith, with the exception that the Contractor will not be responsible to defend or indemnify the Owner for such loss or liability when a particular design, process or product of a particular Manufacturer or Manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Principal Architect/Engineer, unless Contractor knew or reasonably should have known of the patent or copyright violation and failed to notify Owner of same. Owner reserves the right to provide its own defense to any suit or claim of infringement of any patent or copyright in which event Contractor shall, to the extent provided in this Subsection, indemnify and save harmless Owner from all costs and expenses of such defense as well as satisfaction of all judgments entered against Owner.

6.05.4 Owner shall have the right to stop the Work and/or terminate this Contract at any time in the event Owner discovers that Contractor's work methodology includes the use of any infringing design, device, material or process.

6.06 Permits, Fees: Contractor shall obtain and pay for all construction permits, licenses and fees required for prosecution of the Work. However, Owner or Owner's Representative will obtain and pay for the following permits, licenses and/or fees:

- .1 Site Development Permit; and
- .2 Initial Corp of Engineer Permits (404, Letter of Permission only, if applicable).

6.07 Laws and Regulations:

6.07.1 Contractor shall give all notices and comply with all Legal Requirements applicable to furnishing and performing the Work, including arranging for and obtaining any required inspections, tests, approvals or certifications from any governmental entity or public body having jurisdiction over the Work or any part thereof. Except where otherwise expressly required by applicable laws and regulations, neither Owner, Owner's Representative, nor Principal Architect/Engineer shall be responsible for monitoring Contractor's compliance with any Legal Requirements.

6.07.2 Maintaining clean water, air and earth or improving thereon shall be regarded as of prime importance. Contractor shall plan and execute its operations in compliance with all applicable Legal Requirements concerning control and abatement of water pollution and prevention and control of air pollution.

6.07.3 If Contractor performs any Work knowing or having reason to know that it is contrary to applicable Legal Requirements, Contractor shall bear all claims, costs, losses and damages arising therefrom; however, it shall not be Contractor's primary responsibility to make certain that the Specifications and Drawings are in accordance with all Legal Requirements, but this does not relieve Contractor of the Contractor's obligations under the terms of the Contract.

- 6.07.4** This Work is subject to the Texas Pollution Discharge Elimination System (TPDES) permitting requirements for the installation and maintenance of temporary and permanent erosion and sediment controls and storm water pollution prevention measures throughout the construction period.

Contractor's responsibilities are as follows.

- .01** Contractor must prepare a Storm Water Pollution Prevention Plan (SWPPP), or make modifications if SWPPP is already completed and as required, prior to filing the NOI form.
- .02** Contractor must file a Notice of Intent (NOI) form with the TCEQ at least two (2) days prior to start of construction activity and pay for the permit. The required NOI form is available from the Internet at <https://www.tceq.texas.gov/assets/public/permitting/waterquality/forms/20022.pdf>.
The form shall be mailed or submitted online to the TCEQ. If submitting online, the web address is <https://www3.tceq.texas.gov/steers/>. If Contractor has not already registered to use the TCEQ online application submittal service, it will take up to ten (10) working days to receive a user name and password. Contractor shall take this timeframe into consideration if applying online. A Time Extension shall not be granted for this timeframe. The mailing address is:

Texas Commission on Environmental Quality
Stormwater Processing Center (MC-228)
P.O. Box 13087
Austin, TX 78711-3087

For overnight mail: Stormwater Processing Center (MC-228)
12100 Park 35 Circle
Austin, TX 78753

- .03** Contractor must mail a copy of the completed Notice of Intent (NOI) form to the local Municipal Separate Storm Sewer Systems (MS4) representative.
- .04** Contractor must obtain a signed certification statement from all Subcontractors responsible for implementing the erosion and sediment control measures. This statement shall indicate that the Subcontractor understands the permit requirements. The certified statement forms shall be attached to and become part of the SWPPP.
- .05** Contractor must post a notice near the main entrance of the Work with the following information.
 - .1** The TPDES permit number for the Work or a copy of the NOI if a permit number has not yet been assigned,
 - .2** The name and telephone number of a local contact person,
 - .3** A brief description of the Work, and
 - .4** The location of the SWPPP if the Site is inactive or does not have an on-site location to store the plan.
 - .5** If posting this information near a main entrance is infeasible due to safety concerns, the notice must be posted in a local public building. If the Work is linear (pipeline, highway, etc.), the notice must be placed in a publicly accessible location near

where construction is actively underway and moved as necessary. For linear Work, multiple postings of the information may be required by Owner (e.g. postings at both ends of the Work).

- .06** Contractor must maintain all erosion and sediment control measures and other protective measures identified in the SWPPP in effective operating condition.
- .07** Contractor must retain weekly inspection reports and be available for audit by the Owner, the TCEQ or the EPA.
- .08** Contractor must perform inspections every seven (7) calendar days and after every ½ inch rainfall event, noting the following observations on an inspection form provided by Owner:
 - .1** Locations of discharges of sediment or other pollutants from the Site.
 - .2** Locations of storm water / erosion / sedimentation controls that are in need of maintenance.
 - .3** Locations of storm water / erosion / sedimentation controls that are not performing, failing to operate, or are inadequate.
 - .4** Locations where additional storm water / erosion / sedimentation controls are needed.
- .09** Contractor must maintain at Work Site at all times a copy of the SWPPP (with all updates, as described below) and inspection reports.
- .10** Contractor must update the SWPPP as necessary to comply with TPDES permitting requirements, which includes noting changes in erosion / sedimentation controls and other best management practices that are part of the SWPPP and which may be necessary due to the results of inspection reports.
- .11** Contractor must file a Notice of Termination with the TCEQ within thirty (30) days of final stabilization on all portions of the Work Site. Form is available from Owner or on the Internet at:
<https://www.tceq.texas.gov/assets/public/permitting/waterquality/forms/10443.docx>.
The notice shall be mailed to:
Texas Commission on Environmental Quality
Storm Water & General Permits Team;
- .12** Upon completion of the Work, the Contractor must provide copies of all TPDES records to Owner.

6.07.6 Contractor shall abide by all Legal Requirements including, but not limited to, the Endangered Species Act.

6.07.7 Contractor warrants and represents that: (i) Contractor does not have any contracts with and does not provide supplies or services to any organization designated as a foreign terrorist organization by the United States secretary of state as authorized by 8 U.S.C. Section 1189 (a "Foreign Terrorist Organization"); or (ii) the United States government has affirmatively declared Contractor to be excluded from its federal sanctions regime relating to Sudan, its federal sanctions regime relating to Iran, or any federal sanctions regime relating to a Foreign Terrorist Organization.

6.08 Taxes:

- 6.08.1** Contractor shall pay only those sales, consumer, use and other similar taxes required to be paid by Contractor in accordance with the laws and regulations of the State of Texas in the performance of this public works contract.
- 6.08.2** Owner is an exempt organization as defined by Chapter 11 of the Property Tax Code of Texas and is thereby exempt from payment of Sales Tax under Chapter 151, Limited Use Sales, Excise and Use Tax, Texas Tax Code, and Article 1066 (C), Local Sales and Use Tax Act, Revised Civil Statutes of Texas.
- 6.08.3** In addition, if the Project is construction of a water or wastewater system certified by the Texas Commission on Environmental Quality as a regional system, equipment, services and supplies used solely to construct the Project are exempted from taxes imposed by Chapter 151, Limited Sales, Excise and Use Tax, Texas Tax Code.

6.09 Use of Premises:

- 6.09.1** Contractor shall confine construction equipment, the storage of materials and equipment and the operations of workers to the Site and land and areas identified in and permitted by the Contract Documents and other land and areas permitted by laws and regulations, rights-of-way, permits and easements, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment. Contractor assumes full responsibility for any damage to any such land or area, or to the owner or occupant thereof or of any adjacent land or areas, resulting from the performance of the Work. Should any claim be made by any such owner or occupant because of or in connection with the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law. Any such settlement shall not include any admission of liability on the part of Owner and shall be subject to Owner's approval, which approval shall not be unreasonably withheld.
- 6.09.2** Contractor shall defend, indemnify and hold harmless the Owner, the Owner's Representative, the Principal Architect/Engineer, Principal Architect/Engineer's Consultants and anyone directly or indirectly employed by any of them from and against all claims, costs, losses and damages (including court costs and reasonable attorneys' fees) arising out of or resulting from any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Owner's Representative, Principal Architect/Engineer or any other party indemnified hereunder arising out of the Work except to the extent such claims, costs, losses or damages are caused by negligence or fault, breach or violation of a statute, ordinance, governmental regulation, standard or rule or breach of contract of the Owner, the Owner's Representative, the Principal Architect/Engineer, Principal Architect/Engineer's Consultants or any third party under the control or supervision of them other than Contractor or its agent or employee or Subcontractors of any tier.
- 6.09.3** During the progress of the Work and on a daily basis, Contractor shall keep the premises free from any accumulations of waste materials, rubbish and

other debris resulting from the Work. Contractor shall provide such personnel, waste containers and or equipment necessary to maintain an orderly, clean and safe work site. Contractor shall keep all streets, access streets, driveways, and areas of public access, walkways, and other designated areas clean and open at all times. At the completion of the Work, Contractor shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery and surplus materials. Contractor shall have the Site clean and ready for occupancy by Owner at Substantial Completion of the Work. Contractor shall, at a minimum, restore to original condition all property not designated for alteration by the Contract Documents. If the Contractor fails to clean up or restore at the completion of the Work, Owner may do so and the cost thereof will be charged against the Contractor.

6.09.4 Contractor shall not load or permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.10 Record Documents: Contractor shall maintain in a safe place at the Site, or other location acceptable to Owner, one (1) record copy of all red line Record Drawings, Specifications, Addenda, Change Orders, Change Directives, Field Orders and written interpretations and clarifications in good order and annotated to show all changes made during construction. These record documents together with all final samples and all final Shop Drawings and submittals will be available to Owner, Owner Representative, and Principal Architect/Engineer for reference during performance of the Work. Upon Substantial Completion of the Work, these record documents, samples, Shop Drawings and submittals shall become the property of the Owner and shall be neatly labeled and organized per the Owner's direction and promptly delivered in containers acceptable to the Owner, to Owner's Representative. Record drawings must also include an electronic format that is either ".dwg" or ".dxf".

6.11 Safety and Protection:

6.11.01 Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Prior to commencement of the Work, Contractor shall submit a site security plan for approval by Owner. By reviewing the plan or making recommendations or comments, Owner will not assume liability nor will Contractor be relieved of liability for damage, injury or loss. 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 Work 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, but not limited to, trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and Underground Improvements not designated for removal, relocation or replacement in the course of construction.

6.11.02 The Contractor will provide a Safety Manager for this Project. The Safety Manager will be responsible for the safety of the entire Work and the prevention of accidents in connection with the Work. The Safety Manager shall be competent and qualified to perform his/her duties, including but not limited to having received all appropriate Occupational Safety and Health Act of 1970, as amended ("OSHA") and other safety training, and experienced in managing safety programs on construction projects comparable in scope and complexity.

6.11.03 Specific Duties of the Contractor's Safety Manager: This person will ensure compliance with all provisions of the Contract Documents, OSHA, other governmental agencies, industry safety requirements and standards. The Contractor Safety Manager will prepare and enforce a site-specific safety plan for the Work.

- .1** Additional duties of the Contractor's Safety Manager shall include the following:
- (a)** Be responsible for safety over-sight of the entire Work.
 - (b)** Review and direct immediate action to correct all substandard safety conditions.
 - (c)** Be responsible for providing any necessary additional safety personnel with support in carrying out the duties and responsibilities of that position.
 - (d)** Conduct regular supervisory safety meetings, including the discussion of observed unsafe work practices or conditions, a review of accidents experienced and corrective actions, and encouragement of safety suggestions from employees.
 - (e)** Investigate all accidents and implement immediate corrective action.
 - (f)** Cooperate with the insurance carrier(s) and Owner's safety personnel.
 - (g)** Provide timely reports in writing of any observed unsafe conditions or practices, or violations of job security regarding safety issues and take corrective actions.
 - (h)** Report all injuries and accidents in a timely manner to the Contractor and safety personnel in accordance with Contract Documents, federal, state and local laws and regulations.
 - (j)** Ensure that the necessary competent safety persons are on Site as required in the Contract.
 - (k)** Comply with insurance carriers requirements in all accident investigation and reporting procedures.
 - (m)** Coordinate safety activities with insurance carriers, and take necessary steps to promptly implement safety recommendations or directives issued thereby.
 - (n)** Be responsible for the availability and proper use of all necessary safety equipment including personal protective equipment and apparel for the employees.

- (p)** Ensure that adequate first-aid supplies are available at the Work Site and that personnel are qualified and identified to administer first-aid as required.
 - (r)** Be on the Site at all times while Work is in progress. If the Safety Manager has to leave the Site, the Contractor is required to provide an alternate competent and qualified Safety Manager.
- .2** The Contractor Safety Manager shall stop Work as necessary in the event of imminent danger or in situations where they deem necessary to protect a person from injury or prevent property damage.

6.11.04 Contractor shall comply with all applicable Legal Requirements, including but not limited to all laws and regulations of any governmental entity or public body having jurisdiction for safety of persons or property or to protect them from damage, injury or loss and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Improvements, and utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation and replacement of their property. All damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by Contractor or any Subcontractor, Supplier or any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except to the extent of damage or loss attributable to errors or omissions in the Drawings or Specifications, or to the acts or omissions of Owner, the Owner's Representative, or the Principal Architect/Engineer, or Principal Architect/Engineer's Consultant or anyone employed by any of them or anyone for whose acts any of them may be liable other than Contractor or its agent, or employee, or Subcontractors of any tier). Contractor's duties and responsibilities for safety and protection of the Work shall continue until such time as all the Work is completed and Owner's Representative has issued a notice to Owner and Contractor in accordance with Article 14 that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion). Without limitation, Contractor shall comply with the following specific provisions:

- .1** It shall be the duty and responsibility of Contractor and all of its Subcontractors to be familiar with and comply with 29 USC Section 651, et seq., the Occupational Safety and Health Act of 1970, as amended ("OSHA") and to enforce and comply with all provisions of this Act.
- .2** The Contractor and all of its Subcontractors shall comply with all applicable requirements of Subpart P of Part 1926 of 29 C.F.R, OSHA Safety and Health Standards, Texas Health and Safety Code Section 756.023, as amended, and shall submit a unit price for the particular excavation safety systems to be utilized by the Contractor for all excavations which exceed a depth of five feet (5').

6.11.05 Before commencing any excavation which will exceed a depth of five feet (5'), the Contractor shall prepare and employ detailed drawings and specifications regarding the safety systems to be utilized. Said plans and specifications shall include a certification from a registered Texas professional engineer indicating full compliance with the OSHA provisions cited above.

6.11.06 Hazard Communication Programs: Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with applicable laws and regulations.

6.11.07 Emergencies:

- .1** In emergencies affecting the safety or protection of persons or the Work at the Site or adjacent thereto, Contractor, without special instruction or authorization from Owner, Owner Representative, or Principal Architect/Engineer, is obligated to act reasonably to prevent threatened damage, injury or loss and to mitigate damage or loss to the Work. Contractor shall give Owner's Representative telephone notification as soon as reasonably practical and a prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If Owner determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Change Directive or Change Order will be issued to document the consequences of such action.
- .2** Authorized agents of Contractor shall respond immediately to call-out at any time of any day or night when circumstances warrant the presence on Project Site of Contractor or his agent to protect the Work or adjacent property from damage, injury or loss, or to take such action or measures pertaining to the Work as may be necessary to provide for the safety of the public. Should Contractor and/or its agent fail to respond and take action to alleviate such an emergency situation, Owner may direct other forces to take action as necessary to remedy the emergency condition, and Owner will deduct any cost of such remedial action from the funds due Contractor under this Contract, or Contractor shall reimburse Owner for same on demand.
- .3** In the event there is an accident involving injury to any individual or damage to any property on or near the Work, Contractor shall provide to Owner's Representative verbal notification within one (1) hour and written notification within twenty-four (24) hours of the event and shall be responsible for recording the location of the event and the circumstances surrounding the event through photographs, interviewing witnesses, obtaining medical reports, police accident reports and other documentation that describes the event. Copies of such documentation shall be provided to Owner's Representative, for Owner's and Principal Architect/Engineer's records, within forty-eight (48) hours of the event. Contractor shall cooperate with Owner on any Owner investigation of any such incident.

6.12 Continuing the Work: Contractor shall carry on the Work and adhere to the Project Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as Owner and Contractor may otherwise agree in writing.

6.13 Contractor's General Warranty and Guarantee:

6.13.1 Contractor warrants and guarantees to Owner that all Work will conform to the drawings and specifications, be performed in a good and workmanlike manner in accordance with the Contract Documents and will not be Defective and that the whole and entire Work will function and operate as expressed or required by the Contract Documents. This warranty will survive the termination or expiration of the Contract. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

- .1 abuse, modification or improper maintenance or operation by persons other than Contractor, Subcontractors or Suppliers; or
- .2 normal wear and tear under normal usage.

6.13.2 Nothing in this warranty is intended to limit any Manufacturer's warranty which provides Owner with greater warranty rights than set forth in this Section or the Contract Documents. Further, nothing in this warranty shall be limited by the Contractor's obligation to cure defects within any specific corrective or warranty period as required in the Contract Documents, including Section 13.7 below.

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

- .1 observations by Owner's Representative, Owner's CMT Consultant, and/or Principal Architect/Engineer;
- .2 recommendation of any progress or final payment by Owner's Representative;
- .3 the issuance of a certificate of Substantial Completion or any payment by Owner to Contractor under the Contract Documents;
- .4 use or occupancy of the Work or any part thereof by Owner;
- .5 any acceptance by Owner or any failure to do so;
- .6 any review of a Shop Drawing or sample submittal;
- .7 any inspection, test or approval by others;
- .8 any correction of Defective Work by Owner; or
- .9 progress payments or final payment by Owner.

6.13.4 Except as otherwise agreed in writing by the Parties, partial occupancy or use of some or all of the Work or any part thereof shall not commence the corrective period under Section 13.7 below.

6.13.5 Independent from Contractor's warranty and corrective work obligations, Contractor shall be responsible for maintenance of the Work prior to Owner's occupancy or use of same, such that the Work shall be capable of being started-up and operated as designed without any additional

maintenance, or any repair or replacement of, or additional work or services on, the equipment, materials or systems.

6.13.6 Not used.

6.14 INDEMNIFICATION BY CONTRACTOR:

6.14.1 Contractor shall defend, indemnify and hold harmless (collectively, "Indemnify") Owner, the Owner's Representative, the Principal Architect/Engineer, Principal Architect/Engineer's Consultants and Subconsultants and their respective officers, directors, partners, employees, agents and other Consultants (the "INDEMNIFIED PARTIES") from and against all claims, costs, losses, demands, injuries, liabilities, damages, causes of action and expenses (including but not limited to all fees and charges of engineers, architects, attorneys and other professionals and all court or other dispute resolution costs) arising out of or resulting from the Work, provided that any such claim, cost, loss, demand, injury, liability, damage or cause of action:

- .1** Is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, and
- .2** Is caused in whole or in part by any negligent act or omission of Contractor, any Subcontractor, any Supplier, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, even if caused in part by any negligence or omission of one or more of the INDEMNIFIED PARTIES; save and except that Contractor's obligation to Indemnify shall not apply to the extent such claims, costs, losses, demands, injuries, liabilities, damages, causes of action or expenses are caused by negligence or fault, breach or violation of a statute, ordinance, governmental regulation, standard or rule or breach of contract of an Indemnified Party or any third party under the control or supervision of an Indemnified Party other than Contractor or its agent or employee or Subcontractors of any tier.

6.14.2 Notwithstanding Subsection 6.14.1, **CONTRACTOR AGREES TO AND SHALL DEFEND, INDEMNIFY AND HOLD HARMLESS (COLLECTIVELY "INDEMNIFY") OWNER, THE OWNER'S REPRESENTATIVE, THE PRINCIPAL ARCHITECT/ENGINEER, PRINCIPAL ARCHITECT/ENGINEER'S CONSULTANTS AND SUBCONSULTANTS AND THEIR RESPECTIVE OFFICERS, DIRECTORS, PARTNERS, MEMBERS, EMPLOYEES, AGENTS AND OTHER CONSULTANTS (COLLECTIVELY THE "INDEMNIFIED PARTIES" OR INDIVIDUALLY AN "INDEMNIFIED PARTY") FROM AND AGAINST ANY AND ALL CLAIMS, COSTS, LOSSES, DEMANDS, INJURIES, LIABILITIES, DAMAGES, AND CAUSES OF ACTION, INCLUDING BUT NOT LIMITED TO ALL EXPENSES OF LITIGATION, COURT COSTS AND ATTORNEYS' FEES (COLLECTIVELY, IN THIS SUBSECTION 6.14.2, "EMPLOYEE CLAIMS"), FOR BODILY INJURY OR DEATH OF ANY EMPLOYEE OF CONTRACTOR, ITS AGENTS, OR ITS SUBCONTRACTORS OF ANY TIER**

(COLLECTIVELY "EMPLOYEE" FOR THE PURPOSE OF THIS SECTION 6.14.2), ACTUALLY OR ALLEGEDLY OCCASIONED BY, CONTRIBUTED TO OR ARISING OUT OF, IN WHOLE OR IN PART, THE WORK OR THIS CONTRACT, INCLUDING BUT NOT LIMITED TO CLAIMS DUE TO NEGLIGENCE, GROSS NEGLIGENCE, BREACH OF WARRANTY, BREACH OF CONTRACT, VIOLATION OF ANY STATUTE, RULE OR REGULATION OR OTHER ACT OR OMISSION BY CONTRACTOR, ITS EMPLOYEES, AGENTS OR ANY SUBCONTRACTOR OF CONTRACTOR OF ANY TIER, OR THEIR RESPECTIVE AGENTS OR EMPLOYEES, OR ANY OTHER PARTY FOR WHOSE ACTS CONTRACTOR IS LIABLE. CONTRACTOR'S OBLIGATION TO INDEMNIFY SHALL APPLY EVEN IF SUCH EMPLOYEE CLAIMS ARE ACTUALLY OR ALLEGEDLY CAUSED IN WHOLE OR IN PART BY THE ACTS, OMISSIONS, OR NEGLIGENCE OF AN INDEMNIFIED PARTY, EVEN IF SUCH NEGLIGENCE OR OTHER ACTS OR OMISSIONS ARE ACTIVE OR PASSIVE, DIRECT OR INDIRECT, SOLE OR CONCURRENT. THIS INDEMNITY AGREEMENT IS INTENDED TO INDEMNIFY THE INDEMNIFIED PARTIES FROM THE CONSEQUENCES OF THEIR OWN NEGLIGENCE, AS PROVIDED ABOVE.

- 6.14.3** The indemnification obligation under Section 6.14.1 and 6.14.2 shall not be limited in any way by any insurance required by or provided in connection with this Contract or otherwise, or by any limitation on the amount or type of damages, or compensation or benefits payable by or for Contractor or any such Subcontractor, Supplier or other person or organization under workers' compensation acts, disability benefit acts or other employee benefit acts.
- 6.14.4** Notwithstanding anything in Section 6.14.1 or 6.14.2 to the contrary, the obligations of Contractor under Section 6.14.1 and 6.14.2 shall not extend to the liability of a registered architect, a licensed engineer, or an agent, servant or employee of a registered architect or a licensed engineer, for damage that is caused by or results from defects in plans, designs or specifications prepared, approved or used by the architect or engineer, or negligence of the architect or engineer in the rendition or conduct of professional duties called for or arising out of the construction contract and the plans, designs or specifications that are a part of the construction contract; and arises from personal injury or death, property injury, or any other expense that arises from personal injury, death, or property injury.
- 6.14.5** In the event Contractor fails to follow Owner's directives concerning use of the Site, scheduling or course of construction, or engages in other conduct which results in damage to property based on inverse condemnation or otherwise, then and in that event, Contractor shall indemnify Owner against all costs and claims resulting therefrom except to the extent such costs or claims are caused by negligence or fault, breach or violation of a statute, ordinance, governmental regulation, standard or rule or breach of contract of Owner or any third party under the control or supervision of Owner other than Contractor or its agent or employee or Subcontractors of any tier.
- 6.14.6** Subject to the limitation as set out in Section 6.14.4, in the event Contractor's negligence or breach of contract results in Delay in the progress of the Work or the performance of services being done by others

on the Site or otherwise with regard to the Project (including Owner's separate contractors, design professionals, and consultants) so as to result in loss for which Owner becomes liable to such others, then Contractor shall indemnify Owner from and reimburse Owner for such loss, except to the extent such loss is caused by negligence or fault, breach or violation of a statute, ordinance, governmental regulation, standard or rule or breach of contract of Owner or any third party under the control or supervision of Owner other than Contractor or its agent or employee or Subcontractors of any tier.

6.15 Not used.

6.16 Not used.

6.17 Notice of Claim: Should Contractor suffer injury or damage to person or property because of any error, omission or act of Owner or of any of Owner's employees or agents or others for whose acts Owner is liable, a Claim must be made to Owner within five (5) calendar days of the event giving rise to such injury or damage. The provisions of this Section 6.17 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitations or statute of repose.

6.18 Liquidated Damages or Economic Disincentives: Contractor and its Surety shall be liable for liquidated damages or economic disincentives as provided in the Contract for the failure of the Contractor to timely complete the Work within the Contract Time Requirements.

6.19 Commissioning: The Contractor will be responsible to provide all of the required commissioning of the mechanical, electrical, instrumentation, and proprietary equipment and systems for the Project. This is the process of verification, preliminary testing, starting up and functional operations testing of all such equipment and systems which are part of the Project. The term "commissioning" shall specifically include the drafting, review and verification of all test plans and test reports for all equipment and systems which are part of the Project. The verification, testing, start-up and commissioning of the mechanical, electrical, instrumentation, and proprietary equipment and systems for the Project can be performed by the Contractor's personnel or it can be part of a subcontract work package with the Contractor managing and supervising that Scope of Work.

6.19.1 At least ninety (90) days prior to the planned dates for the initiation of the preliminary testing of any mechanical, electrical, instrumentation, and proprietary equipment and systems for the Project, or within a time-frame agreed upon at the Pre-Construction Meeting, the Contractor shall prepare and submit an overall Project Testing and Commissioning Program for Owner, Owner's Representative, and Principal Architect/Engineers' review and approval.

6.19.2 Project Testing and Commissioning Program: The Project Testing and Commissioning Program shall cover all aspects of the Project and shall contain as a minimum, all of the following information:

.1 Equipment Test Plans: An individual Equipment Test Plan configured for each piece of mechanical, electrical, instrumentation, and

proprietary equipment and items on the entire Project that identifies how each piece of such equipment or item is to be verified, tested and commissioned including what functional elements must be demonstrated and precisely how those functional elements will be demonstrated to be operational to the Owner, Owner's Representative, and the Principal Architects/Engineers.

6.20 Shop Drawings & Submittals: The Contractor shall be required to provide submittals, samples and Shop Drawings to the Owner's Representative for transmittal to the Principal Architect/Engineer for approval in accordance with the Schedule of Submittals and section 01 33 00 of Division 01 Submittals.

6.20.1 Each submittal shall be identified in a format and in quantities as may be required by the Owner and section 01 33 00 of Division 01 Submittals. Contractor shall utilize Owner's standard forms unless otherwise approved in writing by the Owner.

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

6.20.3 Before submitting each Shop Drawing or sample, Contractor shall have:

- .1** reviewed and coordinated each Shop Drawing or sample with other Shop Drawings and samples and with the requirements of the Work and the Contract Documents;
- .2** determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
- .3** determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
- .4** determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

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

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

- 6.20.6** Principal Architect/Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Principal Architect/Engineer. Engineer's review and approval will be only to evaluate whether the items covered by the submittals appear that they will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
- 6.20.7** Principal Architect/Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
- 6.20.8** Principal Architect/Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Section 6.20.5 and Principal Architect/Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or sample. Principal Architect / Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Section 6.20.3.
- 6.20.9** Contractor shall make corrections required by Principal Architect / 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 Principal Architect/Engineer on previous submittals.
- 6.21 Operation & Maintenance Manuals:** The Contractor shall be required to provide Operations & Maintenance Manuals for all mechanical, electrical, instrumentation, and proprietary equipment and items being installed as part of the Work. The Contractor must compile all specified instructions, maintenance manuals and operating data as defined under this section and in the Specifications. The compilation and assembly of the Operations & Maintenance Manuals for the Work can be performed by the Contractor's personnel or it can be part of a subcontract work package with the Contractor managing and supervising that Scope of Work. The Contractor shall strictly adhere to all of the requirements for the assembly, formatting and printing of the O&M Manuals as more thoroughly defined in the Contract Documents.
- 6.22 Training of Owner's Personnel:** The Contractor shall be required to provide training of the Owner's designated personnel for all mechanical, electrical, instrumentation, and proprietary equipment and items being installed on the Project. The Contractor must provide this training as defined under this section, Division 01 and the Specifications. The training of the Owner's designated personnel for all mechanical, electrical, instrumentation, and proprietary equipment and items being installed on the Project can be performed by the Contractor's personnel or it can be part of a subcontract work package with the Contractor managing and supervising that Scope of Work.

ARTICLE 7 - OTHER WORK

- 7.1** Owner may perform other work related to the Project at the Site by Owner's own forces, or let other contracts for the other work, or have other work performed by utility owners. Contractor and Owner agree to and shall use best efforts to cooperate and coordinate the Work with others performing work and other work related to the Project in order to avoid conflicts and Delays in the Work.
- 7.2** Contractor shall afford Owner's Independent Contractors and each utility owner (and Owner, if Owner is performing the additional work with Owner's employees) proper and safe access to the Site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work and shall properly connect and coordinate the Work with theirs. Unless otherwise provided in the Contract Documents, Contractor shall do all cutting, fitting and patching of the Work that may be required to make its several parts come together properly and integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating or otherwise altering their work and will only cut or alter their work with the advance written consent of Owner's Representative and the other contractors whose work will be affected. Unless expressly so consented to by such parties, Contractor shall promptly remedy damage caused by Contractor to completed or partially completed construction or to property of the Owner or separate contractors.
- 7.3** 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 Owner's Representative 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 report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.
- 7.4** Owner shall provide for coordination of the activities of the Owner's own forces and of Owner's Independent Contractors with the Work of Contractor, who shall cooperate with them. Contractor shall participate with Owner's Independent Contractors and Owner's Representative in reviewing their construction schedules when directed to do so. On the basis of such review, Contractor shall make any revisions to the Project Schedule agreed upon as necessary after a joint review. The agreed upon construction sequences shall then constitute the Project Schedules to be used by Contractor, separate contractors and Owner until subsequently revised.
- 7.5** Contractor shall coordinate the activities of all Subcontractors. If Owner performs other work on the Project or at the Site with Owner's Independent Contractors, Contractor agrees to reasonably cooperate and coordinate its activities with those of such separate contractors so that the Project can be completed in an orderly and coordinated manner without unreasonable disruption.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

- 8.1** Prior to the start of construction, Owner will designate in writing a person or entity to act as Owner's Representative during construction. The Owner shall retain the right

to communicate directly with the Contractor. However, except as otherwise provided in these General Conditions, the Owner shall issue communications to Contractor through the Owner's Representative. Owner's Representative will be responsible for providing Owner-supplied information and approvals. Owner's Representative will also endeavor to provide Contractor with prompt notice if it observes a failure on the part of the Contractor to fulfill its contractual obligations, including any errors, omissions or defects in the performance of the Work; however, failure of the Owner's Representative to provide Contractor with such notice shall not relieve Contractor of any of its responsibilities under the Contract Documents.

8.2 Owner and Owner's Representative 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. Owner and Owner's Representative are not responsible for any failure of Contractor to comply with Legal Requirements applicable to furnishing or performing the Work. Owner and Owner's Representative are not responsible for Contractor's failure to perform or furnish the Work in accordance with the Contract Documents. Failure or omission of Owner or Owner's Representative to discover, or object to or condemn any Defective Work or material shall not relieve Contractor from the obligation to properly and fully perform the Contract.

8.3 Owner and Owner's Representative are not responsible for the acts or omissions of Contractor, or of any Subcontractor, any Manufacturer or Supplier, or of any other person or organization performing or furnishing any of the Work. Contractor acknowledges and agrees that Owner's or Owner's Representative's direction to perform Work in accordance with the approved Master Project Schedule is not a demand for acceleration or a dictation of Contractor's means or methods.

8.4 Information or services under the Owner's control shall be furnished by the Owner with reasonable promptness. The Owner or Owner's Representative shall have a reasonable amount of time to investigate Site conditions, review submittals, analyze requests for changes, and to make other decisions in the orderly administration of the Contract. Contractor must notify the Owner and/or Owner's Representative in writing, if the time for the investigation, review, analysis of any submittals, required for changes or otherwise required for Owner's decision, impacts in any way the Critical Path of the approved Master Project Schedule.

8.5 Furnishing of Services and Information

8.5.1 Owner may provide, at its own cost and expense, for Contractor's information and use, any of the following, all of which are not binding on Owner, are not Contract Documents, are not warranted or represented in any manner to accurately show the conditions at the Site of the Work, and shall not be the basis for any Claim for damages, additional compensation or extension of time should the actual conditions in the course of the Work vary or differ from conditions or information contained in or inferable from them:

- .1** Surveys describing the property, boundaries, topography and reference points for use during construction, including existing service and utility lines;

- .2 Geotechnical studies describing subsurface conditions, and other surveys describing other latent or concealed physical conditions at the Site;
- .3 Temporary and permanent easements, zoning and other requirements and encumbrances affecting land use, or necessary to permit the proper design and construction of the Project and enable Contractor to perform the Work;
- .4 A legal description of the Site;
- .5 As-built and record drawings of any existing structures at the Site; and
- .6 Environmental studies, reports and impact statements describing the environmental conditions, including Hazardous Conditions, known by the Owner to be in existence at the Site.

ARTICLE 9 – PRINCIPAL ARCHITECT/ENGINEER'S STATUS DURING CONSTRUCTION

9.1 Principal Architect/Engineer's Authority and Responsibilities:

- 9.1.1** The duties and responsibilities and the limitations of authority of Principal Architect/Engineer during construction, as set forth in the Contract Documents, may be assigned or assumed by the Owner, but shall not be extended without written consent of Owner and/or Principal Architect/Engineer. The assignment of any authority, duties or responsibilities to Principal Architect/Engineer under the Contract Documents, or under any agreement between Owner and Principal Architect/Engineer, or any undertaking, exercise or performance thereof by Principal Architect/Engineer, is intended to be for the sole and exclusive benefit of Owner and not for the benefit of Contractor, Subcontractor, Supplier, or any other person or organization, or for any surety or employee or agent of any of them.
- 9.1.2** Principal Architect/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. Principal Architect/Engineer is not responsible for any failure of Contractor to comply with Legal Requirements applicable to the furnishing or performing the Work. Principal Architect/Engineer is not responsible for Contractor's failure to perform or furnish the Work in accordance with the Contract Documents. Failure or omission of Principal Architect/Engineer to discover, or object to or condemn any Defective Work or material shall not relieve Contractor from the obligation to properly and fully perform the Contract.
- 9.1.3** Principal Architect/Engineer is not responsible for the acts or omissions of Contractor, or of any Subcontractor, any Manufacturer or Supplier, or of any other person or organization performing or furnishing any of the Work.
- 9.1.4** If Owner and Principal Architect/Engineer agree, Principal Architect/Engineer will review the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, Bonds and certificates of inspection, tests and approvals and other documentation required to be delivered by Article 14, but only to determine generally that their content appears to

comply 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.

- 9.1.5** The limitations upon authority and responsibility set forth in this Section 9.1 shall also apply to Principal Architect/Engineer's Consultants, Resident Project Representative and assistants.
- 9.2 Visits to Site:** If Owner and Principal Architect/Engineer agree, Principal Architect/Engineer will make visits to the Site at intervals appropriate to the various stages of construction as requested by the Owner or the Owner's Representative and as Principal Architect/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, Principal Architect/Engineer will endeavor for the benefit of Owner to determine, in general, if the Work is proceeding in accordance with the Contract Documents. Principal Architect/Engineer will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. Principal Architect/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 on-site observations, Principal Architect/Engineer will keep Owner and Owner's Representative informed of the progress of the Work and will endeavor to guard Owner against Defective Work. Principal Architect/Engineer's visits and on-site observations are subject to all the limitations on Principal Architect/Engineer's authority and responsibility set forth in Section 9.1 above.
- 9.3 Resident Project Representative:** If Owner and Principal Architect/Engineer agree, Principal Architect/Engineer may furnish a Resident Project Representative to assist Principal Architect/Engineer in providing more continuous observation of the Work. Owner may designate another representative or agent to represent Owner at the Site who is not a Principal Architect/Engineer, Principal Architect/Engineer's consultant, agent or employee.
- 9.4 Clarifications and Interpretations:** Principal Architect/Engineer may determine that written clarifications or interpretations of the requirements of the Contract Documents (in the form of drawings or otherwise) are necessary. Such written clarifications or interpretations will be consistent with the intent of and reasonably inferable from the Contract Documents, will be issued by the Principal Architect/Engineer after consultation with the Owner, and the Contractor will comply with same. If Contractor believes that a written clarification or interpretation alters the Scope of Work and justifies an adjustment in the Contract Amount or the Contract Time Requirements, Contractor may make a Claim as provided in Article 11 or 12.
- 9.5 Rejecting Defective Work:** Principal Architect/Engineer will recommend that Owner disapprove or reject Work which Principal Architect/Engineer believes fails to conform to a requirement of the Contract Documents or believes will not produce a completed Project that conforms to the Contract Documents, or will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

- 9.6** The Principal Architect/Engineer shall not have the authority to issue changes in the field without the express written approval of the Owner.
- 9.7 Shop Drawings:** Refer to Division 01 for Principal Architect/Engineer's authority concerning Shop Drawings.

ARTICLE 10 - CHANGES IN THE WORK

10.1 Changes:

- 10.1.1** Without invalidating the Contract and without providing notice to any Surety, Owner may, at any time or from time to time, order additions, deletions or revisions in the Work. Such changes in the Work will be authorized by Change Order, Change Directive or Field Order. In the event that the Owner and the Contractor are unable to negotiate the terms of a Change Order for the performance of additional Work, the Owner may, at its election, perform such additional Work with its own forces or an Independent Contractor and such work will be considered "Other Work" in accordance with Article 7 or issue a Change Directive.
- 10.1.2** Changes in the Work shall be performed under applicable provisions of the Contract Documents, and Contractor shall proceed promptly, unless otherwise provided in the Change Order, Change Directive or Field Order. Contractor's proposals for changes in the Contract Amount and/or Contract Time Requirements shall be submitted within ten (10) Calendar Days as requested by the Owner, including estimated impacts to the approved Master Project Schedule if any. Owner will review each proposal and promptly respond to Contractor. After initial review of Contractor's proposal by Owner, Contractor shall provide any supporting data requested by Owner, including but not limited to any Subcontractor or Supplier proposal, within seven (7) Calendar Days, unless Owner grants an extension.
- 10.1.3** Contractor shall not be entitled to an increase in the Contract Amount or an extension of the Contract Time Requirements with respect to any Work performed that is not required by the Contract Documents as amended, modified and supplemented as provided in Sections 3.3.1 and 3.3.2, except in the case of an emergency as provided in Section 6.11.15 or in the case of uncovering Work as provided in Section 13.4.
- 10.1.4** Except in the case of an emergency as provided in Section 6.11.15, a Change Order or Change Directive is required before Contractor commences any activities associated with a change in the Work which, in Contractor's opinion, will result in a change in the Contract Amount and/or Contract Time Requirements. Any Work performed prior to Contractor's receipt of a Change Order or Change Directive, will be at Contractor's sole risk and expense, including potential cost impacts and any Delay to the Critical Path of the Master Project Schedule.
- 10.1.5** Not used.
- 10.1.6** Contractor shall provide to the Owner's Representative's all Contractor documentation/records deemed necessary by Owner or Owner's Representative to evaluate the Contractor's Claim including, but not limited

to certified payroll, receipts, bills of lading, invoices, schedules, contractor daily reports, and equipment logs. Other documents, if any, shall be provided pursuant to the Contract Documents.

10.2 Change Orders:

10.2.1 Owner and Contractor shall execute appropriate written Change Orders covering:

- .1 a change in the Work, subject to limitations in Article 10 and elsewhere in the Contract;
- .2 the amount of the adjustment in the Contract Amount, if any; and
- .3 the extent of the adjustment in the Contract Time Requirements, if any.

10.2.2 An executed Change Order shall constitute a settlement of and represent the complete, equitable, and final amount of adjustment in the Contract Amount and/or Contract Time Requirements owed to Contractor or Owner as a result of the occurrence or event causing the change in the Work encompassed by the Change Order.

10.3 Change Directives:

10.3.1 Owner may, by written Change Directive, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Amount and Contract Time Requirements being adjusted as the Owner may deem necessary. A Change Directive may be used in the absence of complete and prompt agreement on the terms of a Change Order, or as otherwise may be deemed to be necessary by the Owner. Where practicable, any items or elements of changed Work that may be agreed upon, prior to the performance of Work under this Article, will be included in a separate Change Order.

10.3.2 If the Change Directive provides for an adjustment to the Contract Amount, the adjustment shall be based on one of the methods provided in Article 11.4.1.

10.3.3 A Change Directive signed by Contractor indicates the agreement of Contractor with the proposed basis of adjustment in the Contract Amount and Contract Time Requirements as described within that Change Directive. Such agreement shall be effective immediately and shall be recorded later by preparation and execution of an appropriate Change Order.

10.3.4 The Contractor is not obligated to execute a Change Directive, but that Change Directive still constitutes valid direction to the Contractor from the Owner. The refusal by the Contractor to accept the terms incorporated within a Change Directive does not invalidate the content of the Change Directive or undermine in any manner the Owner's right to provide the directive contained within that Change Directive. Upon receipt of a Change Directive, Contractor shall promptly proceed with the change in the Work involved, provided, prior to the commencement of any Work under this section, the Contractor must submit its proposed Work plan, anticipated schedule, and a list of its work force and equipment proposed to be used in

such Work for Owner's approval. Upon such approval, Contractor must promptly commence and make continuous progress in the Change Directive Work. The Owner reserves the right to withhold payment for low production or lack of progress.

- 10.3.5** The Owner will allow the Contractor to bill for all portions of a Change Directive for which the Work has been successfully completed, if and to the extent the Change Directive provides for an adjustment to the Contract Amount.

10.4 Field Order:

- 10.4.1** Owner may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Amount or the Contract Time Requirements and are compatible with the design concept of the completed Project as a functioning whole as intended by the Contract Documents. These minor variations shall be accomplished by written Field Order and shall be binding on Owner and on Contractor who shall perform the Work involved promptly. Contractor shall promptly acknowledge in writing the receipt of a Field Order.
- 10.4.2** If Contractor believes that a Field Order justifies an adjustment in the Contract Amount and/or Contract Time Requirements, Contractor shall make a prompt written request to Owner for a Change Order or Change Directive. Any request by Contractor for an adjustment in Contract Amount and/or Contract Time Requirements must be made in writing prior to the Contractor or the Contractor's Subcontractors beginning the Work covered by the Field Order.

10.5 Limitation on Damages for Delay:

- 10.5.1** Contractor shall receive no compensation or damages for Delays except when, and only to the extent that, Contractor demonstrates to the reasonable satisfaction of Owner that direct and unavoidable extra cost to Contractor is caused by: (a) Change Orders or Change Directives (not attributable to Contractor's failure to comply with the Contract Documents or other fault or negligence) that Delay the Work; or (b) specific orders given by Owner to stop or suspend Work (not attributable to Contractor's failure to comply with the Contract Documents or other fault or negligence) that Delay the Work; or (c) failure of Owner to:
- .1** provide permits or material, which is to be furnished by Owner, or
 - .2** provide access to the Work,
- and only to the extent that such circumstances continue after the Contractor furnishes Owner with written notice of such failure, such circumstances are not attributable to Contractor's failure to comply with the Contract Documents or other fault or negligence, and such failure causes Delay;
(a "Compensable Delay").
- 10.5.2** When extra compensation or damages are claimed for a Compensable Delay, Written Notice and support shall be delivered to the Owner as Provided in Section 12.1.1, and a written statement thereof shall be

presented by Contractor to Owner's Representative for Owner's Representative and Owner's review and consideration. Contractor's application for extra compensation or damages shall, however, be subject to review and approval by the Owner. In no event other than a Compensable Delay shall the Contractor be entitled to any compensation or recovery of any damages in connection with any Delays, including without limitation: consequential damages, lost opportunity costs, lost profits, unabsorbed home office overhead or other similar damages, and Contractor hereby expressly waives and releases any and all rights to claim or recover any such compensation or damages. The Owner's exercise of any of its rights or remedies under the Contract Documents (including without limitation ordering changes in the Work, or directing suspension, rescheduling, or correction of the Work), regardless of the extent or frequency of the Owner's exercise of such rights or remedies, shall not be construed as active interference in the Contractor's performance of the Work.

10.5.3 In the event of a Compensable Delay, Contractor's sole and exclusive remedy (other than as provided in Section 10.5.4) shall be recovery of Contractor's General Conditions Costs for the period of time during any Working Day that Contractor is prevented from performing Work on the Critical Path, and Contractor hereby expressly waives and releases any and all rights to claim or recover any other compensation or damages arising out of or related to a Compensable Delay. "General Conditions Costs" consist only of actual and direct costs necessarily incurred by the Contractor and which Contractor was unable to mitigate despite the exercise of reasonable diligence, for standby costs of facilities, machinery, and equipment on Site ("Standby Equipment Costs"), and "Jobsite Overhead" as defined below, calculated as follows:

- .1** Standby Equipment Costs will not be claimable, due or paid for periods when the facilities, machinery or equipment would have otherwise been idle. Claims for Standby Equipment Costs time are limited to no more than eight (8) hours per twenty-four (24) hour day, forty (40) hours per week, and one hundred seventy-six (176) hours per month. Standby Equipment Costs will be payable at 50 percent (50%) of the applicable Blue Book Rental Rates and calculated by dividing the monthly rate by one hundred seventy-six (176), multiplying the result by the number of standby hours, and multiplying that number by the regional adjustment factor and the rate adjustment factor contained in the Blue Book. Operating costs will not be claimable or payable.
- .2** Jobsite Overhead will be claimable and payable based on actual costs that the Contractor will be required to document. "Jobsite Overhead" is defined as the wages or salaries of the Contractor's on-Site administrative and supervisory personnel (when unable to perform other services for Contractor), and reasonable office expenses incurred at the Site office, and will not include any element of home office labor, employees or overhead expenses.

10.5.4 Except as otherwise provided in this Section 10.5, an extension of the Contract Time Requirements, to the extent permitted under Article 12, shall be the sole remedy of the Contractor for any claimed Delays, or loss, costs, expenses or damages incurred as a result of same.

- 10.5.5** This Section 10.5 is intended as a limitation on damages available to Contractor and as a defense in favor of Owner against damages not compensable in accordance with its terms, in both cases pursuant to Section 271.155 of Subchapter I of Chapter 271 of the Texas Local Government Code. Contractor and Owner agree that such limitation and defense shall apply even if Owner is found to have breached the Contract.

ARTICLE 11 - CHANGE OF CONTRACT AMOUNT

- 11.1** The Contract Amount is stated in the Contract and, including authorized adjustments, is the total amount payable by Owner to Contractor for performance of the Work in accordance with the Contract Documents.
- 11.2** Contractor agrees and acknowledges that, unless otherwise permitted by law, the original Contract Amount may not be increased by more than twenty-five percent (25%).
- 11.3** The Contract Amount shall only be changed by a Change Order or Change Directive. Any Claim by Contractor for an adjustment in the Contract Amount shall be made by Written Notice delivered to Owner promptly (but in no event later than fifteen (15) calendar days) after the start of the occurrence or event giving rise to the Claim and stating the general nature of the Claim. Notice of the amount of the Claim with supporting data shall be delivered within thirty (30) calendar days after Written Notice of Claim is delivered by Contractor, and shall represent that the adjustment claimed covers all known amounts to which Contractor is entitled as a result of said occurrence or event. If Owner and Contractor cannot otherwise agree, all Claims by Contractor for adjustment in the Contract Amount shall be determined as set out in Article 16.
- 11.4 Determination of Value of Change Order or Change Directive Work:**
- 11.4.1** The value of any Work covered by a Change Order or Change Directive for an adjustment in the Contract Amount will be determined by one of the following methods:
- .1** by application of unit prices contained in the Contract Documents or subsequently agreed upon to the quantities of the items involved.
 - .2** by a mutually agreed lump sum properly itemized and supported by sufficient substantiating data to permit evaluation.
 - .3** by a cost which has been determined in a manner agreed upon by the Parties and mutually acceptable fixed or percentage fee; or
 - .4** as provided in Subsection 11.5.
- 11.4.2** No cost will be included in the Change Order or Change Directive for the Contractor's time spent preparing the Change Order or responding to the Change Directive, nor will costs be included for the time to negotiate the Change Order or Change Directive costs for machinery, tools, or equipment as described in Subsection 11.5.3.
- 11.4.3** Before using the method described in Section 11.4.1.4, Owner and Contractor agree to attempt to negotiate a Change Order or Change Directive using the methods identified in Sections 11.4.1.1 through

11.4.1.3, as appropriate, to determine the adjustment in the Contract Amount.

11.5 Determination of Value of Change Order or Change Directive Work When No Agreement: If none of the methods defined in Sections 11.4.1.1, 11.4.1.2 or 11.4.1.3 can be agreed upon before a change in the Work is commenced which will result in an adjustment in the Contract Amount, then the change in the Work will be performed by Change Directive, and the appropriate adjustment determined using the Force Account method set forth below in Subsections 11.5.1 through 11.5.6. The "Cost of the Work" consists only of those items specified in Subsections 11.5.1 through 11.5.5, below.

11.5.1 For all personnel, Contractor or Subcontractors will be entitled to reimbursement for wages or salaries and employee benefit costs for extra Work performed using the employees' actual wages or salaries and a forty percent (40%) burden rate. No charge for additional superintendence will be permitted unless considered necessary and ordered by Owner;

11.5.2 Contractor will be entitled to the actual cost, including freight charges, of the materials used and installed on such Work. In case material invoices indicate a discount may be taken, the actual cost will be the invoice price minus the discount;

11.5.3 For machinery, trucks, power tools, or other similar equipment (the "equipment") agreed to be necessary by Owner and Contractor, Contractor will be entitled to reimbursement for actual rental costs;

11.5.4 Contractor will be entitled to the actual cost of Contractor's premiums for Bond(s) and insurance on the extra Work, based on invoices from Surety and insurance carriers. Contractor shall provide Owner's Representative or Owner with invoices from Surety and insurance carriers indicating such cost when requested by Owner's Representative or Owner;

11.5.5 Contractor will be entitled to reimbursement for actual, direct additional General Conditions Costs, but without duplication of any costs otherwise recoverable under this Subsection 11.5, reasonably and necessarily incurred by Contractor in the performance of the extra Work and which can be reasonably demonstrated to the Owner to be necessary to implement the changed Work; and

11.5.6 Contractor will be entitled to allowances for overhead and profit as stated below.

.1 The maximum allowance for overhead and profit on increases due to Change Orders and Change Directives:

	Overhead	Profit
To Contractor for change in the Work performed by Subcontractors:	10 percent	0 percent
To first tier Subcontractors for change in the Work performed by its Subcontractors:	10 percent	0 percent

To Contractor and Subcontractor for change in the Work performed by their respective firms: 10 percent 5 percent

- .2** For changes in the Work performed by Contractor and Subcontractors, allowance for overhead and profit will be applied to an amount equal to cost of all additions less cost of all deletions to the Work. Allowance for overhead to Contractor and first tier Subcontractors on changes performed by Sub-Subcontractors are applied to an amount equal to the sum of all increases to the Work by applicable Sub-Subcontractors, less any decreases in such Sub-subcontractors' Work.

11.5.7 If Owner deletes Work or makes a change which results in a net decrease in the Contract Amount, the Owner is entitled to a credit calculated in accordance with Subsections 11.4.1.1 through 11.4.1.4.

11.5.8 The compensation, as herein provided for, shall be received by Contractor and any affected Subcontractor as payment in full for Work done by Change Directive and will include use of small tools, and total overhead expense and profit. Contractor shall maintain in accordance with generally accepted accounting principles a documented, itemized accounting, evidencing the expenses and savings, including overhead and profit, associated with such changes, both for expenses and savings, in the performance of the Work resulting from the change. Contractor shall submit to Owner's Representative records of Work done by Change Directive at the end of each day, which records will be made upon forms provided for this purpose by Owner, and Contractor shall request that Contractor and Owner's Representative compare records of Work done by Change Directive at the end of each day. Any record of such comparison shall be signed by both Owner's Representative and Contractor, with one copy being retained by Owner and one by Contractor. Refusal by Contractor to sign these records within two (2) working days of presentation does not invalidate the accuracy of the record.

11.6 Unit Price Work:

11.6.1 The following Sections 11.6.1 through 11.6.7 apply only to those elements of the Work which are identified in the Contract Documents as being "Unit Price Work".

11.6.2 Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Amount will be deemed to include for all Unit Price Work an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as set forth in the Bid/Proposal. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids/Proposals and determining an initial Contract Amount. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Owner's Representative. Owner's Representative will review with Contractor the determinations on such matters before rendering a written decision thereon (by recommendation of payment on an Application for Payment or otherwise).

- 11.6.3** When "plan quantity" is indicated for a Bid/Proposal item, Contractor shall be paid the amount specified in the Contract Documents without any measurements.
- 11.6.4** Contractor agrees each Unit Price includes amounts for all overhead and profit associated with performing the units of Work for which the Unit Prices applies.
- 11.6.5** A Major Item is any individual Bid/Proposal item in the Bid/Proposal that has a total cost equal to or greater than five percent (5%) of the original Contract Amount or \$50,000, whichever is greater, computed on the basis of Bid/Proposal quantities and Contract Unit Prices.
- 11.6.6** Owner or Contractor may make a Claim for an adjustment in the Contract Amount in accordance with Article 11 if:
- .1** the actual quantity of any Major Item should become as much as twenty five percent (25%) more than or twenty five percent (25%) less than that in the Bid/Proposal; or
 - .2** Contractor presents documentation contesting accuracy of a "plan quantity" and Owner verifies actual quantity and determines the "plan quantity" is in error by five percent (5%) or more;
- 11.6.7** Provided, however, in the event a Major Item is reduced by twenty-five percent (25%) or more relative to the quantity amount in the Bid/Proposal, no additional Article 11.5.6 profit or overhead will be added, if, due to other additions in the Work, the net value of the Contract Amount is not reduced.

ARTICLE 12 - CHANGE OF CONTRACT TIMES

12.1 Requisites for Changes in Contract Time Requirements:

- 12.1.1** The Contract Time Requirements (including Milestones) may only be changed by Change Order duly executed by both Contractor and Owner or by Change Directive. Any Claim for an adjustment of the Contract Time Requirements (including Milestones) or adjustment of the Contract Amount due to any Compensable Delay as provided in Section 10.5 shall be made by Written Notice delivered by the party making the Claim to the other party promptly (but in no event later than five (5) calendar days after the start of the occurrence or event giving rise to the Delay) and stating the general nature of the Delay. Notice of the extent of the Delay and any requested adjustment of the Contract Amount due to any Compensable Delay as provided in Section 10.5, with supporting data, shall be delivered within thirty (30) calendar days after Written Notice of Claim is delivered by claimant, and shall represent that the adjustment claimed is the entire adjustment to which claimant is entitled as a result of said occurrence or event. If Owner and Contractor cannot otherwise agree, all Claims for adjustment in the Contract Time Requirements (including Milestones) and/or adjustment of the Contract Amount due to any Compensable Delay as provided in Section 10.5 shall be determined in accordance with and

subject to the requirements of Article 16. Notwithstanding anything in the Contract Documents to the contrary, no Claim for an adjustment in the Contract Time Requirements (including Milestones) and/or adjustment of the Contract Amount due to any Compensable Delay as provided in Section 10.5 will be valid if not submitted in accordance with the requirements of this Article.

12.1.2 When Contractor is at fault and Owner stops the Work so that corrections in the Work can be made by Contractor, no extensions of time will be allowed.

12.1.3 In the event of a Delay attributable to Force Majeure, an extension of the Contract Time Requirements (including Milestones) in an amount equal to the time lost due to such Delay shall be Contractor's sole and exclusive remedy for such Delay. "Force Majeure" is circumstances beyond the control of both Owner and Contractor, and not attributable to the fault or negligence of Contractor, any Subcontractor or any other party for whose acts Contractor is liable, and includes an Act of God, war, riot, terrorism, civil commotion, sovereign conduct, industry-wide delays or disruptions in manufacture or delivery of materials or equipment required for the Work, and Unusual Inclement Weather and the direct effects thereof such as standing water or loss of Site power. In such an event, Contractor shall take all commercially reasonable action to mitigate the Delay, and Owner and Contractor will meet no later than three (3) business days after cessation of the event to establish a proposed new Project Schedule for the Project. Any claimed Force Majeure Delay attributable to industry-wide delays or disruptions in manufacture or delivery of materials or equipment required for the Work shall be supported by the following documentation:

- (a)** By copies of purchase orders for Delayed item(s) indicating date ordered by Contractor/Subcontractor and date of purchase order receipt by Supplier;
- (b)** If item(s) require Shop Drawings or other submittal information in accordance with the Contract Documents, by providing records of dates Contractor forwarded submittal(s) to Owner's Representative, dates Owner or Principal Architect/Engineer returned submittal(s) to Contractor, and dates submittal(s) were forwarded to Manufacturer or Supplier;
- (c)** By copies of document(s) from Manufacturer or Supplier, on Manufacturer's or Supplier's letterhead, indicating date(s) item(s) would be ready for shipment and/or actual shipment date(s);
- (d)** By copies of correspondence between Contractor / Subcontractor and Manufacturer or Supplier indicating Contractor / Subcontractor's efforts to expedite item(s); and
- (e)** If item(s) are being purchased by a Subcontractor, by providing correspondence, meeting notes, etc., that reflect Contractor's efforts with the Subcontractor to expedite delivery of the item(s).

12.1.4 The Contractor will only be entitled to an extension of time for Delays that can be demonstrated by the Contractor through critical path analysis as causing Delay, and only for any Delay caused by Force Majeure, Changes ordered in the Work by the Owner through Change Order or Change Directive which justify additional time, or other Delays as described in Section 10.5. No extension of time shall relieve Contractor or Surety on its performance Bond from all of

Contractor's obligations hereunder which shall remain in full force and effect.

12.2 Weather Delays:

12.2.1 Contractor may be granted an extension of time because of "Unusual Inclement Weather", as defined below. However, the Contractor will not be granted an extension of time for "Normal Rain Days", as defined below.

12.2.2 "Unusual Inclement Weather" is defined as a rain event, or extreme temperatures, high winds, hail or lightning, which occurs at the Site and is of sufficient magnitude to prevent Contractor from performing units of Work critical to maintaining the Master Project Schedule on a day when Work is scheduled to be performed and is otherwise capable of being performed, and which is beyond the Normal Rain Days as defined in Section 12.2.3 below.

12.2.3 Baseline Rain Day Determination. "Normal Rain Days" are based on U.S. Weather Bureau Records available for the most immediate area of the Site of the Work, and are included in Owner's Project Schedule, are not a justification for an extension of time, and are broken down by the number of calendar days in each month as follows:

January	7 days	July	6 days
February	6 days	August	7 days
March	7 days	September	6 days
April	7 days	October	7 days
May	8 days	November	6 days
June	8 days	December	6 days

12.2.4 Not used.

12.2.5 Rainfall will be measured with the Owner's Representative's approval at the Site using an approved rain gauge or with the Owner's Representative's approval at the nearest operational public weather data collection facility to the Site.

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

13.1 Notice of Defects: All Defective Work may be rejected, corrected or accepted as provided in Article 13. Contractor must give Owner, Owner's Representative, and Principal Architect/Engineer prompt notice of any Defective Work of which Contractor has actual knowledge. Prompt notice of all Defective Work of which Owner, Owner's Representative, Owner's CMT Consultant, or Principal Architect/Engineer has actual knowledge may be given to Contractor. Payment may be withheld by the Owner for identified Defective Work until such time as the Owner, Owner's Representative, or

Principal Architect/Engineer has determined the Defective Work has been corrected such that it complies with all applicable Contract requirements.

13.2 Access to Work: Owner, Owner's Representative, Owner's CMT Consultant, Principal Architect/Engineer, Principal Architect/Engineer's Consultants, other representatives and personnel of Owner, independent testing laboratories and governmental agencies having jurisdiction will have access to the Work at reasonable times for observing, inspecting and testing. Contractor shall provide them proper and safe conditions for such access, and advise them of Contractor's site safety procedures and programs so that they may comply therewith as applicable.

13.3 Tests and Inspections:

13.3.1 Contractor shall give at least twenty-four (24) hours advance notice of readiness of the Work for all required inspections, tests or approvals, and shall coordinate and cooperate with inspection and testing personnel to facilitate the required inspections or tests.

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

- .1** for inspections, tests or approvals covered by Section 13.3.3 and 13.3.4 below;
- .2** for costs incurred with tests or inspections conducted pursuant to Section 13.4.3 below shall be paid as provided in Section 13.4.3;
- .3** for reinspecting or retesting Defective Work; and
- .4** as otherwise specifically provided in the Contract Documents.

All testing laboratories shall meet the requirements of ASTM E-329.

13.3.3 If Legal Requirements require any Work (or part thereof) specifically to be inspected, tested or approved by an employee or other representative of any governmental entity or public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests or approvals, pay all costs in connection therewith and furnish Owner's Representative the required certificates of inspection or approval.

13.3.4 Contractor shall also be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests or approvals required for Owner's, Owner's CMT Consultant's, Owner's Representative's, and Principal Architect/Engineer's review of materials or equipment to be incorporated in the Work, or of materials, mix designs or equipment submitted for review prior to Contractor's purchase thereof for incorporation in the Work.

13.4 Uncovering Work:

13.4.1 If any Work that is to be inspected, tested or approved is covered by Contractor without prior written concurrence of Owner's Representative, or if any Work is covered contrary to the written request of Owner's Representative, Contractor must, if requested by Owner's Representative,

uncover and recover the Work at Contractor's expense, except as provided in Section 13.4.2.

13.4.2 Uncovering Work as provided in Section 13.4.1 shall be at Contractor's expense unless Contractor has given Owner's Representative timely notice of Contractor's intention to cover the same and Owner's Representative has not acted within five (5) working days of receipt of such notice.

13.4.3 If Owner's Representative considers it necessary or advisable that permissibly covered Work be observed, inspected or tested, Contractor shall uncover, expose or otherwise make available for observation, inspection or testing that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is Defective, Contractor shall pay or otherwise bear all claims, costs, losses and damages arising out of or resulting from such uncovering, exposure, observation, inspection and testing and satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others). If, however, such Work is not found to be Defective, Contractor shall, subject to Section 13.4.1, be allowed an increase in the Contract Amount or an extension of the Contract Time Requirements (including Milestones), or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement and reconstruction.

13.5 Owner May Stop the Work:

13.5.1 If the Work is Defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to furnish or perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty or obligation on the part of Owner to exercise this right for the benefit of Contractor or any Surety or other party.

13.5.2 If Contractor fails to correct Defective Work or submit a plan that is satisfactory to Owner for taking corrective action, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated, or Owner may take any other action permitted by this Contract. A notice to stop the Work, based on defects, shall not stop Calendar or Working Days charged against the Contract Time Requirements.

13.6 Correction or Removal of Defective Work: If required by Owner, Contractor shall promptly, as directed, either correct all Defective Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by Owner or Owner's Representative, remove it from the Site and replace it with Work that is not defective. Contractor shall correct or remove and replace Defective Work, or submit a plan of action detailing how the deficiency will be corrected, within the time frame identified in the notice of Defective Work. Contractor shall pay all claims, costs, losses and damages arising out of or resulting from such correction or removal (including but not limited to all costs of repair or replacement of Work of others, and all costs of reinspecting and/or retesting such Defective Work).

13.7 Corrective period:

13.7.1 If within one (1) year after the date of Substantial Completion or such longer period of time as may be prescribed by Legal Requirements or by the terms of any applicable special guarantee or express warranty required by the Contract Documents or by any specific provision of the Contract Documents (including but not limited to Section 14.11.2), any Work, including Work performed after the Substantial Completion date, is found to be Defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

- (a) correct such Defective Work, or, if it has been rejected by Owner, remove it from the Site and replace it with Work that is not Defective, and
- (b) satisfactorily correct or remove and replace any damage to other Work or the work of others, or damage to other property, whether personal or real property, resulting from the correction, removal or replacement of such Defective Work.

Such one (1) year or longer period will renew and recommence for Work requiring correction upon the completion of correction of such Work.

13.7.2 If Contractor does not promptly comply with the terms of Owner's corrective action instructions, or in an emergency where Delay would result in unreasonable risk of loss or damage, Owner may have the Defective Work corrected or the rejected Work removed and replaced, and all claims, costs, losses and damages arising out of or resulting from such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid or otherwise borne by Contractor.

13.7.3 In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the corrective period for that item will still start to run from the date of Substantial Completion of the Work.

13.7.4 If correction of Defective Work will affect the function or use of the facility, Contractor shall not proceed with correction of Defective Work without prior coordination with and approval of Owner.

13.7.5 The obligations of the Contractor to perform warranty and corrective work will survive the acceptance of the Work and any termination of the Contract.

13.7.6 Owner will utilize the "Warranty Item Form" a copy of which is attached hereto for the purpose of providing written notice of defects discovered during the corrective period. Contractor will acknowledge receipt of the notice by dating, signing, completing and returning the form to Owner when the defect is corrected, including such information on or attached to the form to describe the nature of the repairs or corrections that were made. If the defect cannot be corrected within seven (7) Calendar Days of receipt of notice, Contractor shall promptly provide a written explanation to Owner (or Owner's Representative) describing the repairs or other correction needed and the time required to complete the repairs or other correction.

- 13.7.7** Establishment of the required period for correction of Work as described in Subsection 13.7.1 above relates only to the specific obligation of the Contractor to correct defects in Work discovered during the corrective period, and has no relationship to the time within which any obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to any failure by Contractor to have complied with its obligations under the Contract Documents.
- 13.7.8** All Manufacturer and extended Manufacturer warranties shall be assigned to Owner as a condition of Final Completion.
- 13.8 Acceptance of Defective Work:** If, instead of requiring correction or removal and replacement of Defective Work, Owner decides to accept it, Owner may do so. Contractor shall pay or otherwise bear all claims, costs, losses and damages attributable to Owner's evaluation of and determination to accept such Defective Work. If any such acceptance occurs prior to recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents and compensating Owner for the diminished value of the Defective Work. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner after a calculation by Owner of the diminution in value of the Defective Work.
- 13.9 Owner May Correct Defective Work:** If Contractor fails within a reasonable time after Written Notice of Owner to correct Defective Work, or to remove and replace rejected Work, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven (7) calendar days' Written Notice to Contractor, correct any such deficiency. If, in the sole discretion of the Owner, significant progress has not been made by Contractor during this seven (7) calendar day period to correct the deficiency, the Owner may exercise any actions necessary to remedy the deficiency. In exercising the rights and remedies under this paragraph, Owner may 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, its agents and employees, Owner's other contractors, Principal Architect/Engineer and Principal Architect/Engineer's consultants access to the Site or any such offsite storage facility to enable Owner to exercise the rights and remedies under this paragraph. All claims, costs, losses and damages incurred or sustained by Owner in exercising such rights and remedies will be paid or otherwise borne by Contractor and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work. 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. Contractor shall not be allowed an extension of the Contract Time Requirements (including Milestones), or entitled to make any claim for damages resulting from any Delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies hereunder.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 Application for Progress Payment:

- 14.01.1** No more often than once a month, Contractor shall submit to Owner or if directed by Owner, to Owner's Representative, for review an Application for Payment, in a form acceptable to Owner, filled out and signed by Contractor covering the Work completed as of the last day of the month for which an Application for Payment is being made. Application for Payment shall be accompanied by such supporting documentation as is required by the Contract Documents. The Application for Payment shall constitute Contractor's representation that the Work has been performed in accordance with the Contract Documents, has progressed to the point represented in the Application for Payment, and that title to all Work has passed or will pass to Owner free and clear of all claims, encumbrances, and security interests upon the incorporation of the Work into the Project, or upon Contractor's receipt of payment, whichever occurs earlier.
- 14.01.2** Such applications shall not include requests for payment on account of changes in the Work which have been properly authorized by Change Directives, if the Change Directive does not provide for an adjustment to the Contract Amount, or if the changes in the Work are not yet included in Change Orders.
- 14.01.3** Such applications shall not include requests for payment of amounts the Contractor does not intend to pay to a Subcontractor or Manufacturer or Supplier because of a dispute or other reason.
- 14.01.4** If payment is requested on the basis of materials or equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall be accompanied by such bills of sale, data and other information satisfactory to Owner and Owner's Representative substantiating Owner's title to such materials or equipment or otherwise protecting Owner's interests therein. Payment on account of such materials or equipment will not include any amount for Contractor's overhead or profit or relieve Contractor of its obligation to protect and install such materials or equipment in accordance with the requirements of the Contract and to correct or restore damaged or Defective Work and shall in no event exceed eighty five percent (85%) of the line item valuation for such materials or equipment in the Schedule of Values. If materials or equipment are stored at another location, at the direction of the Owner they shall be stored in a bonded and insured facility, accessible to Owner's Representative and Principal Architect/Engineer, CMT Consultant, and Owner, and shall be clearly marked as property of Owner. Contractor shall insure such materials and equipment while so stored and in transit to the Site. Title to materials delivered to the Site of the Work or a staging area will pass to Owner upon payment by Owner without the necessity for further documentation. Risk of loss for all such materials and equipment will not pass to Owner until final payment.
- 14.01.5** In making progress payments, ten percent (10%) of the approved amount shall be retained until final completion and acceptance of the Contract Work. However, if the Owner at any time after fifty percent (50%) of the

work has been completed finds that satisfactory progress is being made, Owner may authorize any of the remaining progress payments to be made in full. Also, if the Contractor has achieved Substantial Completion of the Work and the Owner finds the amount retained to be in excess of the amount adequate for the protection of the Owner, Owner, at its sole discretion, may release to the Contractor all or a portion of such excess amount. The Owner is not obligated to pay interest on amounts retained except as provided in the Agreement. The interest rate to be paid on such retainage shall be the rate of interest paid by the Owner's depository bank on interest bearing accounts of similar amounts during the period of time interest accrues as provided herein.

14.01.6 Applications for Payment shall include the following documentation:

- .1** an updated Project Schedule and narrative;
- .2** an Affidavit of all bills paid to Subcontractors and Suppliers in the Monthly Subcontractor Payment Reporting Form included in the Specifications;
- .3** conditional waivers and releases from Contractor upon progress and final payments, in the forms included in the Specifications; and
- .4** a Contractor's Monthly Report;

14.02 Contractor's Warranty of Title: Contractor warrants and guarantees that title to all Work, materials and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner free and clear of all claims no later than the time of payment to Contractor.

14.03 Review of Applications for Progress Payment:

14.03.1 Contractor shall submit its Application for Payment to the Owner's Representative not later than three (3) days after the first day of each month. The Owner's Representative will, within seven (7) calendar days after receipt of each Application for Payment, either indicate a recommendation for payment and forward the Application for Payment for processing by Owner, or return the Application for Payment to Contractor indicating Owner's Representative's reasons for refusing to recommend payment. In the latter case, Contractor shall make the necessary corrections and resubmit the Application for Payment.

14.03.2 Owner's Representative's recommendation of any payment requested in an Application for Payment will constitute a representation by Owner's Representative, based upon Owner's Representative's on-site observations of the executed Work and on Owner's Representative's review of the Application for Payment and the accompanying schedules and other information, that to the best of Owner's Representative's knowledge, information and belief:

- .1** the Work has progressed to the point indicated; and
- .2** the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for unit price Work, and to any other qualifications stated in the recommendation).

14.03.3 By recommending any such payment, Owner's Representative will not be deemed to have represented that:

- .1 exhaustive or continuous on-site inspections have been made to check the quality or the quantity of the Work;
- .2 examination has been made to ascertain how or for what purpose Contractor has used money previously paid on account of the Contract Amount;
- .3 Contractor's construction means, methods, techniques, sequences or procedures have been reviewed; or
- .4 that there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment from Contractor.

14.04 Decisions to Withhold Payment:

14.04.1 Owner may withhold or nullify the whole or part of any payment to such extent as may be necessary on account of:

- .01 Defective Work not remedied;
- .02 third party Claims filed or reasonable evidence indicating probable filing of such Claims;
- .03 failure of Contractor to timely or properly make payments to Subcontractors or for labor, materials or equipment;
- .04 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Amount;
- .05 damage to Owner or another contractor for which Contractor is responsible;
- .06 reasonable evidence that the Work will not be completed within the Contract Time Requirements, and that the unpaid balance would not be adequate to cover actual or liquidated damages or economic disincentives for the anticipated Delay;
- .07 failure of Contractor to submit a Schedule of Values in accordance with the Contract Documents;
- .08 failure of Contractor to submit a submittal schedule in accordance with the Contract Documents;
- .09 failure of Contractor to submit and update the construction Project Schedule in accordance with the Contract Documents;
- .10 failure of Contractor to maintain a record of changes on drawings and documents;
- .11 failure of Contractor to maintain weekly payroll reports and, as applicable, provide copies of reports in a timely manner upon request of Owner;
- .12 Contractor's neglect or unsatisfactory prosecution of the Work, including failure to clean up;
- .13 property damage claims that are the responsibility of the Contractor; or
- .14 failure of Contractor to comply with any provision of the Contract Documents.

14.04.2 When the above reasons for withholding payment are remedied or no longer exist, Contractor shall resubmit a statement for withheld amounts. Payment will be made within forty-five (45) calendar days of receipt by

the Owner of an approved Application for Payment, subject to Article 14.05 and Government Code, Section 2251.025(b).

14.05 Delayed Payments: Owner shall endeavor to, but shall not be obligated to, make payment to Contractor within thirty (30) calendar days of receipt of an Application for Payment in acceptable form, including all supporting documents and information required. However, Contractor agrees that should Owner fail to make payment to Contractor of the sum due on any such Application for Payment within forty-five (45) calendar days after the day on which Owner received the Application for Payment, then Owner will pay to Contractor, in addition to the sum due on such Application for Payment, interest thereon at the rate specified in Government Code, Section 2251.025(b) from date due until fully paid, which shall fully liquidate and shall be Contractor's sole and exclusive remedy for any injury to or damages incurred by Contractor arising out of such delay in payment.

14.06 Arrears: No money shall be paid by Owner upon any claim, debt, demand or account whatsoever, to any person, firm or corporation who is in arrears to the Owner for taxes; and the Owner shall be entitled to counterclaim and automatically offset against any such debt, claim, demand or account in the amount of taxes so in arrears and no assignment or transfer of such debt, claim, demand or account after said taxes are due, shall affect the right of Owner to so offset said taxes, and associated penalties and interest if applicable, against the same.

14.07 Substantial Completion:

14.07.1 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall notify Owner's Representative and request a determination as to whether the Work or designated portion thereof is substantially complete. If Owner, Owner's Representative or the Principal Architect/Engineer does not consider the Work substantially complete, Owner's Representative will notify Contractor giving reasons for that position. After performing any required Work, Contractor shall then submit another request for Owner's Representative to determine Substantial Completion. If Owner considers the Work substantially complete, Owner's Representative will prepare and deliver a certificate of Substantial Completion which shall establish the date of Substantial Completion, shall include a punch list of items to be completed or corrected before final payment, shall establish the time within which Contractor shall complete or correct the punch list items, and shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work, warranties, corrective periods, and insurance.

Failure to include an item on the punch list does not alter the responsibility of Contractor to complete all Work in accordance with the Contract Documents. If a Certificate of Occupancy or Certificate of Compliance is required by governmental entities or public authorities having jurisdiction over the Work, said certificate shall be issued before the Work or any portion thereof is considered to have achieved Substantial Completion. The certificate of Substantial Completion shall be signed by Owner and Contractor to evidence acceptance of the responsibilities assigned to them in such certificate.

- .1** For water and wastewater lines construction, Substantial Completion means, in addition to the definition at Section 1.072, that the Work, including all testing and disinfection, have been completed and accepted and the line(s) placed into service. A certificate of Substantial Completion may not be issued. Work that remains after Substantial Completion could include the final pavement of roadways, adjustment of structures to final grade and re-vegetation. Owner's Representative will issue a notice specifying what portion of the Work is partially completed for the purpose of payment and what Work remains to be done on the portion being accepted as having achieved Substantial Completion.
- .2** For water and wastewater lines construction that includes roadway construction and/or reconstruction, a certificate of partial Project Substantial Completion may be given for the Work described and deemed substantially complete per Article 14.07.1.1, exclusive of any Project roadway construction and/or reconstruction. Having received a certificate of partial Substantial Completion on the water and wastewater lines construction, a certificate of Substantial Completion of the entire or balance of the Project may be given when the roadway construction and/or reconstruction is found to be substantially complete as per Article 14.07.1.3. The requirements of Article 14.08 Partial Utilization, shall also apply.
- .3** For roadway construction and/or reconstruction, Substantial Completion means, in addition to the definition at Section 1.072, that the Work, including the final surface course, all permanent traffic control devices (pavement markings, signs, etc.), punch list items, and final cleanup has been completed, accepted, and placed into service, and, any street lighting conduit that has been installed, lowered or relocated must be inspected for usability by, and must have received written approval from, the Owner as well as having been completed, accepted, and placed into service. A certificate of Substantial Completion may not be issued. Work that remains after Substantial Completion could include final clean up. The Owner's Representative will issue a notice specifying what portion of the Work is partially completed for the purpose of payment and what Work remains to be done on the portion being accepted as having achieved Substantial Completion.
- .4** Substantial Completion shall also comprise the completion of Work associated with the Project so that the utilities, systems, equipment, and/or facilities are operating properly and functioning per their intended use, as designed. Work that can be completed between Substantial Completion and Final Completion includes finish work such as cleanup, finish painting, landscape repairs, and final documentation. However, Contractor shall provide all Owner required equipment and system operation and maintenance training and Manufacturer certifications, and shall submit all spare parts and final O&M Data in order for Substantial Completion to be deemed achieved.

14.07.2 Owner shall have the right to exclude Contractor from the Work after the date of Substantial Completion, but Owner will allow Contractor

reasonable access to complete or correct items on the punch list and perform and complete warranty or corrective work.

14.07.3 Unless otherwise provided in the Contract Documents, for all periods prior to the issuance of a Certificate of Substantial Completion for the Project or for any designated area within the Project, the Contractor shall be responsible for the cost of all temporary and permanent utility charges necessary to maintain the progress and quality of the construction Work which is under the Contractor's control.

14.07.4 Unless otherwise provided in the Contract Documents, for all periods prior to the issuance of a Certificate of Substantial Completion for the Project or for any designated area within the Project, the Contractor shall be responsible for the cost of all temporary structural support systems necessary for the safe execution of the Work. Such systems shall be the sole responsibility of the Contractor.

14.08 Partial Utilization: Use by Owner, at Owner's option, of any substantially completed part of the Work which: (i) has specifically been identified in the Contract Documents, or (ii) Owner and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, may be accomplished prior to Substantial Completion of all the Work in accordance with the following:

14.08.1 Owner at any time may request Contractor to permit Owner to use any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If Contractor agrees that such part of the Work is substantially complete, Contractor shall certify to Owner's Representative that such part of the Work is substantially complete and request Owner's Representative to issue a notice specifying what portion of the Work is substantially complete for the purpose of payment and what Work remains to be done on the portion being accepted. Contractor at any time may notify Owner's Representative that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Owner's Representative to issue a notice specifying what portion of the Work is substantially complete for the purpose of payment and what Work remains to be done on the portion being accepted. The provisions of Sections 14.7.1 and 14.7.2 will apply with respect to notice specifying what portion of the Work is substantially complete for the purpose of payment and what Work remains to be done on the portion being accepted.

14.08.2 Such partial utilization must be authorized to the extent required by any governmental entities or public authorities having jurisdiction over the Work.

14.08.3 Warranty and corrective period requirements for such partial utilization shall be in accordance with Section 13.7.3 above.

14.09 Final Inspection: Upon Written Notice from Contractor that the entire Work or an agreed portion thereof is complete, Owner will make a final inspection with Contractor and provide Written Notice of all particulars in which this inspection

reveals that the Work is incomplete or Defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies. Owner's Representative, Principal Architect/Engineer, CMT Consultant and other third party consultants and any other governmental entity or public authority with jurisdiction over the Project may assist Owner in the inspection and testing of the Work and Contractor agrees to and shall cooperate with any such consultants or authorities with respect to any such inspections and tests.

14.10 Final Application for Payment: Contractor may make application for final payment following the procedure for progress payments after Contractor has completed all such corrections to the satisfaction of Owner (and Owner's Representative) and delivered the following documents:

- 14.10.01** Affidavit by Contractor certifying the payment of all debts and claims;
- 14.10.02** Architect's/Engineer's Certificate of Completion;
- 14.10.03** Three (3) complete final operating and maintenance manuals, each containing maintenance and operating instructions, schedules, guarantees, and other documentation required by the Contract Documents;
- 14.10.04** Record documents (as provided in Section 6.10);
- 14.10.05** Complete releases or waivers (satisfactory to Owner) of all claims arising out of or filed in connection with the Work;
- 14.10.06** Certificate evidencing that insurance required by the Contract, if any, will remain in force after final payment and through the warranty and corrective periods and any longer period of time required by the Contract;
- 14.10.07** Non-Use of Asbestos Affidavit (After Construction) and lead based paints;
- 14.10.08** TPDES records in accordance with Section 6.07.4;
- 14.10.09** Consent of Surety, if any, to final payment; and
- 14.10.10** Any other documentation required by the Contract Documents.

14.11 Final Payment and Acceptance:

14.11.1 If, on the basis of observation of the Work during construction, final inspection, and review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Owner's Representative and Owner are satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled and there are no outstanding claims, Owner's Representative will recommend the final Application for Payment and thereby notify the Owner, who, if it accepts such recommendation, will pay to Contractor the balance due Contractor under the terms of the Contract. If the sole remaining unfinished item

to complete the Work is the reestablishment of vegetation, Owner has the right to require Contractor to execute and deliver to Owner a re-vegetation letter with a reasonable fiscal amount posted via an irrevocable, callable on demand letter of credit issued by a financial institution acceptable to Owner and at no cost to Owner to ensure completion of this item, as a condition of final payment. This Work must be accomplished within one hundred twenty (120) Calendar Days of the date of Final Completion of the Work. When the permanent erosion control has been established, Owner will initiate an inspection for final acceptance of the erosion controls. If the re-vegetation is not completed within the one hundred twenty (120) Calendar Days, Owner, at its option, may draw upon and complete the Work using the proceeds of the posted re-vegetation letter of credit.

14.11.2 Owner will issue a certificate of Final Completion to Contractor which establishes the Final Completion date. If the sole remaining unfinished item to complete the Work is the reestablishment of vegetation, and Contractor has executed the above-described re-vegetation letter of credit to ensure completion of this item, the Owner will issue a certificate of conditional acceptance to Contractor which establishes the Final Completion date.

14.11.3 Final payment is considered to have taken place when Contractor or any of its representatives negotiates Owner's final payment check, whether labeled final or not, for cash or deposits the check in any financial institution for its monetary return.

14.12 Waiver of Claims by Contractor: The making and acceptance of final payment will constitute A waiver of all claims by Contractor against Owner other than those previously made in writing and still unsettled at the time of the final payment.

14.13 Contractor's Payment Obligations Contractor will pay the Subcontractors, in accordance with its contractual obligations to such parties, all the amounts Contractor has received from Owner on account of their work. Contractor will impose similar requirements on the Subcontractors to pay those parties with whom they have contracted. Contractor will defend and indemnify Owner from and against any claims for payment by any such parties.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.1 Owner May Suspend Work Without Cause: At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than one hundred twenty (120) calendar days by Written Notice to Contractor, or such longer period of time as agreed to in writing by Owner and Contractor. Contractor shall promptly resume the Work upon Owner's written direction to proceed. Contractor shall be allowed an adjustment in the Contract Amount or an extension of the Contract Time Requirements, or both, directly attributable to any such suspension if Contractor makes an approved Claim therefor as provided in Articles 10.5 and 12.1.

15.2 Owner May Terminate Without Cause: Upon seven (7) calendar days' Written Notice to Contractor, Owner may, without cause and without prejudice to any right

or remedy of Owner, elect to terminate the Contract. In such case, Contractor shall be paid (without duplication of any items):

- 15.2.1** for completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination;
- 15.2.2** for reasonable demobilization costs;
- 15.2.3** for reasonably anticipated profits on completed and accepted Work not previously paid and not included in separate pay items calculated to date of termination but not for anticipated profit on unperformed Work or unabsorbed overhead, or lost opportunity; and
- 15.2.4** for all costs reasonably incurred in settlement of terminated contracts with Subcontractors, Manufacturers, Suppliers and others, including for reasonably anticipated profits on completed and accepted Work not previously paid and not included in separate pay items calculated to date of termination but not for anticipated profit on unperformed Work or unabsorbed overhead, or lost opportunity. Contractor agrees to negotiate in good faith with Subcontractors, Manufacturers, Suppliers and others to mitigate its and Owner's costs.

15.3 Owner May Terminate With Cause:

- 15.3.1** Upon the occurrence of any one or more of the following events (each, a "default"):
 - .1** if Contractor persistently fails to perform the Work in accordance with the Contract Documents;
 - .2** if Contractor disregards Legal Requirements;
 - .3** if Contractor disregards the authority of Owner or Owner's Representative;
 - .4** if Contractor makes fraudulent statements;
 - .5** if Contractor fails to maintain a work force adequate to accomplish the Work within the Contract Time Requirements;
 - .6** if Contractor fails to make adequate progress and endangers successful completion of the Contract; or
 - .7** if Contractor otherwise breaches any provision of the Contract Documents;

Owner may, after giving Contractor (and the performance bond Surety, if any) seven (7) calendar days Written Notice, terminate in whole or in part the Contract or the Contractor's right to perform Work. Owner, at its option, may proceed with negotiation with Surety for completion of the Work. Alternatively, Owner may exclude Contractor from the Site and take possession of the Work (without liability to Contractor for trespass or conversion), incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and finish the Work as Owner may deem expedient. In such case Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Amount exceeds all claims, costs, losses and damages sustained by Owner arising out of or resulting from the Contractor's default and Owner's completion of the Work,

including attorneys' fees and other expenses and additional Owner's Architect/Engineer fees and other expenses in connection with such completion, Owner shall pay Contractor only for the value of unpaid, conforming Work performed by Contractor prior to such termination up to but not more than such excess. If such claims, costs, losses and damages exceed such unpaid balance, Contractor or Surety shall pay the difference to Owner upon demand. In the event that a termination for cause is found to be wrongful, the termination shall be deemed converted to a termination without cause as set forth in Section 15.2 and Contractor's remedy for wrongful termination shall be exclusively limited to the recovery of the payments permitted for termination without cause as set forth in Section 15.2.

15.3.2 Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor and Surety then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

15.4 Contractor May Stop Work or Terminate: If through no act or fault of Contractor, the Work is suspended for a period of more than one hundred and twenty (120) calendar days by Owner or under an order of court or other governmental entity or public authority, or such longer period of time as agreed to in writing by Owner and Contractor, or (except during disputes) Owner's Representative fails to forward to Owner for processing any properly prepared and submitted Application for Payment within seven (7) calendar days after it is submitted, or (except during disputes) Owner fails for forty-five (45) calendar days after it is submitted to pay Contractor any sum finally determined by Owner to be due, then Contractor may, upon forty-five (45) calendar days' Written Notice to Owner, and provided Owner does not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Section 15.2. The provisions of this Section 15.4 are not intended to preclude Contractor from making a Claim under Articles 11 and 12 for an increase in Contract Amount or Contract Time Requirements or otherwise for expenses or damage directly attributable to Contractor's stopping Work pursuant to this Section.

15.5 Discretionary Notice to Cure: In its sole discretion, Owner may, but is not required to, provide a Notice to Cure to Contractor and its Surety to cure an event of default described in Section 15.3.1 above and/or an anticipatory breach of contract and, if required by Owner, the Contractor and Surety shall attend a meeting with Owner, regarding the Notice to Cure, the event of default, and/or the anticipatory breach of contract. If issued, the Notice to Cure will set forth the time limit by which the cure is to be completed or commenced and diligently prosecuted. Upon receipt of any Notice to Cure, Contractor shall prepare a report describing its program and measures to accomplish the cure of the event of default and/or anticipatory breach of contract within the time required by the Notice to Cure. The Contractor's report must be delivered to Owner at least three (3) days prior to any requested meeting with the Owner and Surety.

15.6 Bankruptcy: If Contractor declares bankruptcy or is adjudged bankrupt or makes an assignment for the benefit of creditors or if a receiver is appointed for the benefit of creditors or if a receiver is appointed by reason of Contractor's insolvency, Contractor may be unable to perform this Contract in accordance with the Contract

requirements. In such an event, Owner may demand Contractor or its successor in interest provide Owner with adequate assurance of Contractor's ability to perform in accordance with the terms and conditions of the Contract. If Contractor fails to provide adequate assurance of performance to Owner's reasonable satisfaction within ten (10) days of such a request, Owner may terminate the Contract or the Contractor's right to perform Work for cause or without cause, pursuant to Sections 15.2 or 15.3 above. If Contractor fails to provide timely adequate assurance of its performance and actual performance, Owner may prosecute the Work with its own forces or with other contractors on a time and material or other appropriate basis and the cost of which will be charged against the Contract balance or otherwise borne by Contractor.

15.7 Duty to Mitigate: In the event of any termination or suspension under this Contract, the Contractor agrees to and shall take all reasonable actions to mitigate its damages and any and all claims for damages which may be asserted against the Owner.

15.8 Responsibility during Demobilization: While demobilizing, the Contractor will take all necessary and reasonable actions to preserve and protect the Work, the Site and other property of the Owner or others at the Site.

ARTICLE 16 - DISPUTE RESOLUTION

16.1 Filing of Claims:

16.1.1 All Claims by Contractor shall be made by Written Notice delivered to Owner within fifteen (15) calendar days after the start of the occurrence or event giving rise to the Claim and stating the general nature of the Claim. Notice of the amount of the Claim with supporting data shall be delivered in writing within thirty (30) calendar days after Written Notice of Claim is delivered by Contractor and shall represent that the adjustment claimed covers all known monetary amounts and/or extensions of time to which Contractor is entitled.

16.1.2 Within thirty (30) calendar days of receipt of notice of the amounts and/or time extensions sought by the Claim with supporting data, Owner's Representative and Contractor shall meet to discuss the Claim, after which a written offer of settlement or written notification of no settlement offer may be made to Contractor. If Contractor is not satisfied with any proposal presented, Contractor shall have thirty (30) calendar days in which to: (i) submit additional supporting data requested by the other party along with a written request to re-evaluate the Claim; (ii) modify the initial Claim; or (iii) request Alternative Dispute Resolution.

16.2 Alternative Dispute Resolution:

16.2.1 If a dispute exists concerning a Claim, the parties agree to use the following procedure prior to pursuing any other available remedies except that nothing herein shall preclude the Owner from seeking injunctive or other extraordinary relief in a court of competent jurisdiction prior to the completion of the following procedure. Owner reserves the right to include the Owner's Representative, Principal Architect/Engineer and/or the CMT Consultant as a party. Similarly, Contractor agrees to participate at its own

cost in similar dispute resolution procedures for any dispute between Owner and any such other parties, and Contractor agrees to require its Subcontractors to participate in the following procedures in any dispute between Owner and Contractor, upon Owner's written request, if in Owner's sole discretion the participation of Contractor and/or any Subcontractor is necessary to the resolution of any such dispute.

16.2.2 Negotiating with Previously Uninvolved Personnel: Either party may make a written request for a meeting to be held between representatives of each party within fourteen (14) Calendar Days of the request or such later period that the parties may agree to. Each party shall endeavor to include, at a minimum, one (1) previously uninvolved senior level decision maker (an owner, officer, or employee of each organization) with the authority to negotiate and settle the dispute on behalf of their organization. If a previously involved senior level decision maker is unavailable due to the size of the Contractor's organization or any other reason, the Contractor shall nonetheless provide an appropriate senior level decision maker for the meeting. The purpose of this and any subsequent meetings will be good faith negotiations and resolution of the matters constituting the dispute. Negotiations shall be concluded within thirty (30) Calendar Days of the first meeting, unless mutually agreed otherwise. This step may be waived by a written agreement signed by both parties, in which event the parties may proceed directly to mediation as described below.

16.2.3 Mediation:

- .1** If the procedure described in 16.2.2 proves unsuccessful or is waived pursuant to its terms, the parties shall initiate the mediation process. Owner and Contractor agree to select within thirty (30) calendar days a mediator trained in mediation skills, and experienced in the mediation of construction disputes, to assist with resolution of the dispute. Owner and Contractor agree to act in good faith in the selection of the mediator and to give all due consideration to qualified individuals nominated to act as mediator. Should the parties fail to agree on a mediator within thirty (30) calendar days of initiation of the mediation process, the parties agree to ask the American Arbitration Association to select a qualified individual, which selection shall be binding on the parties. If the dispute is technical in nature, the mediator appointed by the American Arbitration Association shall be qualified by at least ten (10) years' experience in construction, engineering, and/or public works projects. If a party refuses to participate in the selection of a mediator or refuses to attend a scheduled mediation, the other party may pursue other remedies available to it.
- .2** Mediation is a forum in which an impartial person, the mediator, facilitates communication between parties to promote reconciliation, settlement, or understanding among them. The parties hereby agree that mediation, at a minimum, shall provide for (i) conducting an on-site investigation, if appropriate, by the mediator for fact gathering purposes, (ii) a meeting of all parties for the exchange of points of view and (iii) separate meetings between the mediator and each party to the dispute for the formulation of resolution alternatives. The parties agree to participate in mediation in good faith for up to thirty

(30) calendar days after the date of the first mediation session, unless mutually agreed otherwise. Should the parties fail to reach a resolution of the dispute through mediation, then the parties may pursue other remedies available to them.

ARTICLE 17 – MISCELLANEOUS

- 17.1 Computation of Times:** When any period of time is measured in the Contract Documents in 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 legal holiday, such day will be omitted from the computation.
- 17.2 Venue; Choice of Law:** Venue for any suit at law or in equity involving the Contract or the parties' relationship created by it shall lie exclusively in Montgomery County, Texas. The Contract and any disputes arising out of it shall be construed in accordance with and governed by the laws of the State of Texas, without regard to its conflict of laws principles. Any claims or causes of action arising under or in conjunction with this Contract shall be brought in a court of competent jurisdiction in Montgomery County, Texas. In the event of litigation relating to this Contract or the performance or nonperformance of Work hereunder, the Contractor and the Owner voluntarily and irrevocably consent to the jurisdiction of the applicable courts in Montgomery County, Texas, and hereby waive any argument that such a forum is inconvenient.
- 17.3 Extent of Contract:** This Contract represents the entire and integrated agreement between the Owner and Contractor with respect to the subject matter hereof and supersedes all prior and contemporaneous negotiations, representations or agreements, whether written or oral, and each party disclaims any reliance upon any such prior or contemporaneous negotiation, representation or agreement.
- 17.4 Remedies Cumulative:** Except as limited by this Contract, remedies provided for herein are cumulative, and in addition to and not in lieu of those provided by law or available in equity.
- 17.5 Severability:** If any word, phrase, clause, sentence or provision of the Contract, or the application of same to any person or set of circumstances is for any reason held to be unconstitutional, void, invalid or unenforceable, then such word, phrase, clause, sentence or provision shall be deemed severed herefrom and the remainder of this Contract shall remain in full force and effect.
- 17.6 Independent Contractor:** The Contract shall not be construed as creating an employer/employee relationship, a partnership, or a joint venture. Contractor is an independent contractor and Contractor's work and services shall be those of an independent contractor. Without limiting the generality of the foregoing, Contractor agrees and understands that the Contract does not grant any rights or privileges to any employee of Contractor, its Subcontractors or Suppliers which are established for employees of Owner.
- 17.7 Prohibition of Gratuities:** Owner may, by Written Notice to Contractor, terminate the Contract without liability if Owner determines that gratuities were offered or given by Contractor or any agent or representative of Contractor to any officer or employee of Owner with a view toward securing the Contract or securing

favorable treatment with respect to the awarding or amending or the making of any determinations with respect to the performing of such Contract. In the event the Contract is terminated by Owner pursuant to this provision, Owner shall be entitled, in addition to any other rights and remedies, to recover or withhold the amount of the cost incurred by Contractor in providing such gratuities, to the extent Contractor attempted to charge Owner for same or included any such costs in the Contract Amount.

17.8 Prohibition Against Personal Interest in Contracts: No officer, employee, independent consultant, or elected official of Owner who is involved in the development, evaluation, or decision-making process of the performance of any solicitation shall have a financial interest, direct or indirect, in the Contract resulting from that solicitation. Any violation of this provision shall render the Contract voidable by Owner.

17.9 Owner's Right to Audit:

17.9.1 "Records" means all records generated by or on behalf of Contractor and each Subcontractor and Supplier of Contractor, whether paper, electronic, or other media, which are in any way related to performance of or compliance with this Contract, including, without limitation:

- .01** accounting records;
- .02** written policies and procedures, contractor daily diaries, and pay reports;
- .03** subcontract files (including proposals of successful and unsuccessful bidders, bid recaps, etc.);
- .04** original estimates and estimating work sheets;
- .05** correspondence;
- .06** Change Order files (including documentation covering negotiated settlements);
- .07** back charge logs and supporting documentation;
- .08** general ledger entries detailing cash and trade discounts earned, insurance rebates and dividends;
- .09** subcontracts, purchase orders or other agreements between Contractor and any Subcontractor or Manufacturer, or Supplier;
- .10** records necessary to evaluate Contract compliance, Change Order pricing, and any Claim submitted by Contractor or any of its payees;
- .11** SWP3 Documentation;
- .12** job cost reports; and
- .13** any other Contractor record that may substantiate any charge or claim related to this Contract.

17.9.2 Contractor shall allow Owner's agent or its authorized representative to inspect, audit, and/or reproduce, or all three, all Records generated by or on behalf of Contractor and each Subcontractor and Manufacturer or Supplier, upon Owner's written request. Further, Contractor shall allow Owner's agent or authorized representative to interview any of Contractor's employees, all Subcontractors and all Manufacturers and Suppliers, and any of their respective employees.

17.9.3 Contractor shall retain all its Records, and require all its Subcontractors and Manufacturers and Suppliers to retain their respective Records, during the

performance of this Contract and for three (3) years after final payment or any termination, until all audit and litigation matters that Owner has brought to the attention of Contractor are resolved, or as otherwise required by law, whichever is longer. Owner's right to inspect, audit or reproduce Records, or interview employees of Contractor or its respective Subcontractors or Manufacturers and Suppliers exists during the performance of this Contract, and for three (3) years after final payment or any termination, until all audit and litigation matters that Owner has brought to Contractor's attention are resolved, or as otherwise required by law, whichever is longer, and at no cost to Owner.

- 17.9.4** Contractor must provide sufficient and accessible facilities during its normal business hours for Owner to inspect, audit or reproduce Records, or all three, and to interview any person about the Records.
- 17.9.5** Contractor shall insert these requirements in each written contract between Contractor and any Subcontractor, Manufacturer or Supplier and require each Subcontractor, Manufacturer and Supplier to comply with these provisions.
- 17.10 Survival of Obligations:** All representations, indemnifications, warranties and guarantees made in, required by or provided pursuant to the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion and acceptance of the Work and termination or completion of the Contract.
- 17.11 No Waiver:** The waiver of any provision of this Contract will not be deemed to be a waiver of any other provision of this Contract. No provision of this Contract will be deemed waived whatsoever unless expressly provided in writing, nor will a waiver of any default be deemed a waiver of any subsequent defaults of the same type. The failure at any time to enforce this Contract, whether the default is known or not, shall not constitute a waiver of or estoppel against the right to do so.
- 17.12 Condition Precedent to Right to Sue:** Notwithstanding anything in the Contract Documents to the contrary, the Contractor must have provided at least 90 days prior written notice of a claim for damages as a condition precedent to the right to sue on the Contract.
- 17.13 WAIVER OF THE RIGHT TO JURY TRIAL. OWNER AND CONTRACTOR HEREBY, KNOWINGLY, IRREVOCABLY AND INTENTIONALLY WAIVE ANY RIGHTS EITHER PARTY MAY HAVE TO A TRIAL BY JURY IN RESPECT TO ANY CLAIM, CAUSE OF ACTION, PROCEEDING OR COUNTER CLAIM BASED UPON THE CONTRACT DOCUMENTS, OR ARISING OUT OF, UNDER OR IN CONNECTION WITH THE CONSTRUCTION OF THE WORK OR ANY COURSE OF CONDUCT, COURSE OF DEALING, STATEMENTS (WHETHER VERBAL OR WRITTEN) OR ACTIONS OF ANY PARTY. HOWEVER, THIS WAIVER OF JURY TRIAL SHALL NOT APPLY TO LITIGATION WHICH MAY BE INITIATED BY ANY THIRD PARTIES.**
- 17.14 Attorneys' Fees and Costs.** If Contractor brings any suit against Owner and Contractor does not prevail in such suit, Contractor shall be liable for all attorneys' fees and costs incurred by Owner as a result of such suit.

"Prevail" as used in this Section 17.14 means the Contractor recovers a judgment against Owner for at least eighty percent (80%) of all relief sought by Contractor in Claims against Owner in the Written Notice(s) as provided in Section 16.1.1 above, and the judgment is greater than any relief offered to Contractor by Owner in any written settlement offer.

END OF GENERAL CONDITIONS TERMS

WARRANTY ITEM NO. _____
(PROJECT NAME)

The General Conditions of the Contract require that Defects be corrected within seven (7) days after written notice is received.

TO: _____
name/ address / telephone / fax / email

ATTENTION OF: _____

FROM: _____
project manager name / address / telephone / fax / email

PROJECT: _____
name / location / CIP ID number

END DATE OF WARRANTY OR CORRECTIVE PERIOD: _____

SUBJECT: _____

☐ If checked, the defect requires immediate attention. The Contractor has been called.

☐ If checked, the Owner has been asked to consult with the Contractor on the defect.

PLEASE CORRECT THE FOLLOWING ITEM(S):

DATE OF REQUEST _____ **SIGNATURE** _____
Project Manager

☐ _____ Phone No. _____

☐ _____ Phone No. _____

☐ _____ Phone No. _____

RESPONSE FROM Contractor: DATE CORRECTION WAS MADE: _____

The Contractor must endeavor to correct the defect within seven (7) calendar days after written notice is received. If the defect cannot be corrected by that time, Contractor shall provide a written explanation to the Owner describing the repairs or other correction needed and the time required to complete the repairs or corrections.

Description of corrections made:

DATE OF REPLY: _____ **SIGNATURE:** _____

PRINTED NAME: _____

When the repair/correction is complete, the contractor should return a copy to each of the following:

☐ _____ Phone No. _____

☐ _____ Phone No. _____

☐ _____ Phone No. _____

END OF SECTION

4812-4844-0915, v. 1-6602-9900, v. 4-6602-9900, v. 3-6602-9900, v. 2

SECTION 00 73 43
WAGE SCALE FOR CONSTRUCTION

- 1.1 Contractor and its Subcontractors must pay the general prevailing wage rates for building construction for each craft or type of worker or mechanic employed in the execution of any building construction or repair under the Contract in accordance with Chapter 2258 of the Texas Government Code. The San Jacinto River Authority ("SJRA") has determined the prevailing wage rate in the locality in which the work is being performed, which is set forth in Exhibit "A".
- 1.2 In bidding, Contractor warrants and represents that it has carefully examined the classifications for each craft or type of worker needed to execute the Contract and determined that such classifications in Exhibit "A" include all necessary categories to perform the work under the Contract.
- 1.3 If Contractor believes that an additional classification for a particular craft or type of worker is necessary to perform work under the Contract, it must submit with its bid a request to the San Jacinto River Authority to use an additional labor classification not listed in Exhibit "A" and specify the proposed new classification. The SJRA shall determine whether a proposed classification is already covered in Exhibit "A", and, if it is, specify which classification is appropriate. The SJRA's decision is conclusive. If the SJRA decides that a new classification is necessary, it will determine the appropriate prevailing wage rate for any resurveyed, amended, new, or additional craft or type of worker not covered by Exhibit "A". Such determination must be decided in accordance with procedures established by the SJRA, and in compliance with Chapter 2258 of the Texas Government Code.
- 1.4 Contractor must not use any labor classification not covered by Exhibit "A" until such classification is established and approved for use by the SJRA.

A Contractor or Subcontractor who violates Chapter 2258 of the Texas Government Code must pay to the SJRA \$60 per each worker employed for each calendar day or part of the day that the worker is paid less than the wage rates set forth in Exhibit "A".
- 1.5 The SJRA may withhold money required to be withheld under Chapter 2258 of the Texas Government Code from the final payment to Contractor or earlier payments if the SJRA makes a determination that there is good cause to believe that Contractor has not complied with these provisions and Chapter 2258 of the Government Code, in which

case the SJRA may withhold the money at any time subsequent to the finding by the SJRA.

- 1.6 Contractor and Subcontractors must keep records as required by Chapter 2258 of the Government Code, and specifying:
- (1) the name and classification of each worker employed under the Contract; and
 - (2) the actual per diem wages paid to each worker, and the applicable hourly rate.
- The records must be open at all reasonable hours for inspection by the officers and agents of the SJRA.
- 1.7 The prevailing wage rate does not prohibit the payment of more than the rates stated.
- 1.8 The hourly cost of salary for non-exempt workers for labor in excess of 40 hours per worker per week, shall be calculated at 1.5 times the worker's base pay, plus 1.0 times fringe benefits, for the applicable craft and level.

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EXHIBIT "A"

LABOR CLASSIFICATIONS AND PREVAILING WAGE RATES
FOR
CONSTRUCTION
2019

Heavy Construction Projects

County Name: Montgomery and Waller Counties

Wages based on DOL General Decision: TX1900063 01/04/2019 TX63

CLASSIFICATION	RATE	FRINGES
Sprinkler Fitter (Fire Sprinklers)	\$29.03	\$15.84
Carpenter	\$14.38	
Ironworker, reinforcing	\$11.29	
Laborers:		
Common Montgomery County	\$8.83	\$0.94
Common Waller County	\$8.97	\$0.88
Landscape	\$7.35	
Mason Tender Cement	\$9.96	
Pipelayer Montgomery County	\$10.04	
Pipelayer Waller County	\$10.07	
Cement Mason / Concrete Finisher	\$11.37	\$1.13
Electrician	\$18.40	\$1.34
Formbuilder / Formsetter	\$13.35	\$1.17
Pipefitter	\$17.00	\$0.04
Power Equipment Operator:		
Backhoe	\$13.25	
Bulldozer Montgomery County	\$13.12	
Bulldozer Waller County	\$12.46	
Crane	\$14.91	\$0.58
Excavator	\$16.74	
Front End Loader Montgomery County	\$12.30	\$0.57
Front End Loader Waller County	11.75	\$0.92
Grader	\$12.20	\$1.48
Tractor	\$12.38	\$1.51
Truck Driver Montgomery County	\$11.82	\$0.92
Truck Driver Waller County	12.28	\$0.98
Welders – Receive rate prescribed for craft performing operation to which welding is incidental.		

END OF SECTION

SECTION 01 11 13

WORK COVERED BY CONTRACT DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Definitions.
2. Work Covered by Contract Documents.
3. Cash Allowances.
4. Owner-Furnished Products.
5. Document Management Software.
6. Work Sequence.
7. Work Guidelines.
8. Coordination of Work.
9. Contractors Use of Premises.
10. Contract Clarification.
11. Alternate Construction Methods.
12. Utility Lines.
13. Warranty.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Proposing Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS (NOT USED)

1.4 DEFINITIONS

- A. Mobilization Area: For Work at facilities, an area, defined on the Contract Drawings, for Contractor staging and storage of construction equipment, tools, products, and spare parts.

1.5 WORK COVERED BY CONTRACT DOCUMENTS

- A. Installation of Owner-provided 1,500 kW diesel standby generator. Work to include site preparation and installation of concrete foundation for proposed generator at location of existing conduit stub-ups, setting and bolting of generator to foundation, setting and installation of Owner-provided raised platform and other components (included with generator, see attached submittal in Appendix A), electrical work inside adjacent electrical building to disconnect conduit and wiring from existing generator, and electrical work inside adjacent electrical building for installation of conduit and wiring to connect new generator. The new generator will be delivered to the site by Owner or Owner's vendor. The scope of this project will include the need for the equipment to remove and set the generator from the Owner's or Owner vendor's vehicle. The contractor will need to coordinate with the Owner (construction manager) and Owner's representatives to schedule delivery time and date of generator to the site.

As noted, the 1,500 kW natural gas standby generator will be provided to the Contractor. Contractor will coordinate with the Owner and generator vendor to identify the date and time for generator delivery to Wastewater Treatment Facility No. (coordinate date/time with Owner/vendor a minimum 2 weeks in advance; delivery times to be between 7:30 AM-3:00 PM Monday through Friday, excluding holidays). Following off-loading of generator at site, Contractor assumes all responsibility for care of and installation to operation of the generator at the site. The Contractor will coordinate with the generator and manufacturer and/or distributor for required testing, start-up and training, and providing of test reports and Operations and Maintenance (O&M) manuals.

1.6 CASH ALLOWANCES (NOT USED)

1.7 OWNER-FURNISHED PRODUCTS

A. Items furnished by the Owner for installation and final connection by Contractor:

1. 1,500 kW Cummins diesel stand-by generator. Refer to instructions in Section 1.5A of this specification.
2. Water for construction activities.

B. Contractor's Responsibilities:

1. Arrange and pay for product delivery to site.
2. Receive and unload products at site; jointly with Owner's Representative, inspect for completeness or damage.
3. Handle, store, install, and finish products.
4. Repair or replace damaged items.

1.8 DOCUMENT MANAGEMENT SOFTWARE

A. Contractor and the Owner's Representative shall be given the applicable number of Document Management System user names and passwords.

B. Contractor shall use the Owner's internet based document management system to transmit its documents to the Owner's Representative, including but not limited to Requests for Information (RFIs), shop drawing submittals, applications for payment, and letters of correspondence. Refer to Specification Section 01 33 00 – Submittals. The document management software should be able to automatically notify all team members of a submittal upload regardless of the originator, i.e. contractor, Principal Architect/Engineer, Owner's Representative, or Owner. Notification of new uploads should go to all team members regardless if they are the Principal Architect/Engineer or not, i.e. sub-consultants for construction management & inspection, but are not tasked as the Principal Architect/Engineer.

C. A minimum of one (1) and a maximum of three (3) accounts on the document management system will be provided by the Owner. Additional accounts may be requested by the Contractor.

D. Each account will allow one (1) user to access the document management system. Training on the document management system will be provided by the Owner as requested by the Contractor at a mutually agreed upon date and location.

1.9 WORK SEQUENCE

A. Coordinate construction schedule and operations with the Owner's Representative. Subcontractors shall coordinate its activities and operations with the Contractor.

- B. Data for all facilities and utilities shown were taken from available plans, record drawings, and/or utility maps made available from several sources. Actual field locations of facilities and utilities may vary from that shown on the Drawings. Contractor shall make a complete and independent verification of utility locations prior to submittal of subsequent shop drawings. Unless otherwise approved by the Owner's Representative, work shall not continue at locations where there is a conflict with existing utilities.
- C. Construction disturbing traffic shall be conducted during off-peak hours, 9:00 a.m. to 4:00 p.m. weekdays and/or weekends 7:00 p.m. Friday to 4:00 a.m. Monday, dependent upon provisions of Texas Department of Transportation. Exception to these times, if necessary, shall be sought during the permit application process. Continue work in areas using same construction schedule during consecutive days and/or weekends until work is completed.

1.10 WORK GUIDELINES

- A. Maintain local driveway access to public schools, residential and commercial properties adjacent to work areas at all times. Provide temporary driveway access in accordance with Specification Sections 01 55 26 – Traffic Control and 01 14 19 – Use of Premises. Coordinate work and schedule with impacted business owners, schools, and residents in conjunction with the Owner's Representative, well in advance of commencing the Work in the area(s) of the impacted entities.
- B. Contractor shall adhere to each privately owned and operated utility company's construction guidelines when constructing the proposed Work adjacent-to or across each such entities wet or dry utility. Contractor to coordinate with such utilities for guidelines.
- C. Contractor shall coordinate its Work with the respective pipeline companies' at all proposed utility crossings. See appropriate Contract Drawings for additional and /or related information.
- D. Obtain right-of-entry agreement(s), insurance, crossing permit(s), and other documentation as required or deemed necessary by each utility or pipeline company or other such entity at no additional cost to the Owner.
- E. Contractor shall coordinate its Work schedule with those utility companies who require a representative of their company to be present (onsite) during the construction adjacent-to or across their wet or dry utility.
- F. Site restoration at all crossings shall be performed immediately upon completion of the Work. Restoration shall be performed in accordance with all applicable Specification Sections and utility company requirements.
- G. Hand dig within one (1) foot of underground service lines (public or private).

- H. Contractor shall bear the sole responsibility for damage to existing utilities resulting from its construction activities. The Contractor shall be responsible for the repair of damaged utilities, at no additional cost to the Owner.

1.11 COORDINATION OF WORK

- A. Coordinate activity schedule and extend full cooperation to other Contractors who have responsibilities either concurrent with, proceeding, or following this project's duration along the work site. Ensure availability of access to selected portions of this project area to others and provide appropriate information for planning purposes to other Contractors. No compensation or time extension will be allowed as a result of conflicting construction activities.
- B. Comply with coordination requirements outlined in Specification Section 01 14 19 – Use of Premises.
- C. Coordinate work with the following construction activities by others:
- D. Dial 811 to contact either Texas 811 or Lone Star 811 One-Call all three (3) One-Call centers in the state of Texas a minimum of forty-eight (48) hours prior to construction within twenty-five (25) feet of a private pipeline.
- E. Contact SJRA a minimum of seventy-two (72) hours prior to construction at 281-367-9511 to mark utilities.
- F. Contact WJPA (TWAA) a minimum of seventy-two (72) hours prior to construction at 855-426-7283 to mark utilities.

Contact numbers for such centers are as follows:

1. TESS (Texas) One Call (800) 344-8377.
 2. Texas One-Call (800) 245-4545.
 3. Texas (Lone Star) One Call (800) 669-8344.
- G. Approvals from the following pipeline entities are needed for this project. Approvals are obtained during design and are the responsibility of the Principal Architect/Engineer:
- H. Existing structures adjacent to the proposed alignment shall be closely monitored prior to, during, and after construction is complete in all areas. Several conditions including, but not limited to, soil type, construction methods, weather conditions, surrounding construction, personnel experience, and supervision may impact the amount of ground movement within and surrounding the alignment. Contractor shall survey and adequately document the condition and elevation of existing structures adjacent to the proposed alignment. Monitoring program for proposed trenchless construction operations should be developed in accordance with trenchless construction Specification Sections.
- I. All work shall be performed to the lines, grades, elevations, and locations shown on the Drawings.

- J. Prevent overstress or damage of any structure and any part or member of it during construction. This applies to new and existing facilities, utilities, and structures affected by construction operations. Contractor shall monitor and record the effect of its construction operations on new and existing facilities, utilities and structures and provide engineered temporary supports and connections as required to assure the safety and stability of the same to prevent overstress of any part.
- K. Contractor Work performed within all rights-of-way shall be performed in accordance with the respective entities' standards. Contractor to coordinate with such entities to obtain required standards.

1.12 CONTRACTOR USE OF PREMISES

- A. Comply with all requirements outlined in Specification Section 01 14 19 – Use of Premises.

1.13 CONTRACT CLARIFICATION

- A. Should clarification of the Contract Documents be requested, request clarification before proceeding with Work by submitting a Request for Information (RFI). Such requests shall be preceded by a diligent investigation of the Contract Documents. Include evidence of such investigation(s) in all requests for clarification.

1.14 ALTERNATE CONSTRUCTION METHODS

- A. Alternate construction means and methods will be permitted in accordance with applicable Contract Document details and specification at no additional cost to the Owner. Alternate construction means and methods shall provide a substantial benefit to the project and/or the Owner. Contractor accepts full responsibility for all additional costs of geotechnical investigations and other incidental items, including any re-design that may be necessary to permit the alternate construction means and methods.
- B. Contractor shall submit the below listed modifications for alternate construction methods to the Owner's Representative for Principal Architect/Engineer and Owner's consideration. Submittal shall be made prior to commencement of any construction activity utilizing an alternate construction method. Contractor execution of alternate construction methods prior to its receiving Principal Architect/Engineer and Owner's approval shall be at the sole risk of the Contractor for removal and replacement at no additional cost to the Owner. The following modifications must also be signed and sealed by a Licensed Professional Engineer registered in the State of Texas prior to submittal to Owner's Representative.
 - 1. Revisions to foundation design;
 - 2. Revisions to electrical design.

- C. If alignment revisions are requested, Contractor shall immediately inform the Owner Representative of any proposed changes and any potential impacts the revised alignment may have on that portion of the transmission line segment and all adjacent line segments, existing or proposed.

1.15 UTILITY LINES

- A. All utilities represented on the Drawings are shown as an approximate location and are based on the best information available during project design. Contractor shall field-verify the exact location of all utilities prior to commencing construction. The Contractor shall be responsible for any and all damage to these utilities, caused or resulting from their failure to locate, protect and/or maintain these utilities during construction.

1.16 WARRANTY

- A. Comply with the warranty requirements stipulated in Contract Document General Conditions and the warranty requirements of the various specification sections of this project manual.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 14 19

USE OF PREMISES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Administrative and procedural requirements for:
 - a. Contractor Responsibilities
 - b. Temporary Utilities
 - c. Limits of Construction
 - d. Storage Sheds and Buildings
 - e. Working Times
 - f. Site Access Times
 - g. Notification to Adjacent Occupants
 - h. Safety Requirements
 - i. First Aid Equipment
 - j. Fire Protection
 - k. Security Measures
 - l. Protection of Utilities, Pipelines, and Property
 - m. Surface Restoration
 - n. Traffic Control and Use of Public Rights of Way
 - o. Contractor's Roads and Parking
 - p. Coordination with Facility Owner's Operations
 - q. Contractor's Field Office
 - r. Principal Architect/Engineer's Field Office
 - s. Project Photographs
 - t. Special Considerations Related to Adjacent Properties and Facilities
 - u. Historical and Archaeological Sites

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Proposing Requirements, Contract Forms, and General Conditions of the Contract.

2. Division 01 – General Requirements.
3. Specification Section 31 21 33 – Trenching, Backfilling, and Compacting for Utilities.

1.2 MEASUREMENT AND PAYMENT

- A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS

- A. See Specification Section 01 33 00 – Submittals for the requirements for the mechanics and administration of the submittal process.
- B. Contractors Safety Program.
- C. All proposed notifications to adjacent occupants.
- D. Planning requests for temporary Owner's facility shutdowns.

1.4 CONTRACTOR RESPONSIBILITIES

- A. Comply with applicable requirements specified in other sections of Project Specifications.
- B. Comply with procedures for access to the site and Contractor's use of rights-of-way.
- C. Maintain and operate temporary construction facilities and temporary systems to assure continuous service of Owner's and other adjacent existing facilities.
- D. Modify and extend temporary systems as Work progress requires.
- E. Completely remove materials and equipment when no longer required.
- F. Restore existing facilities used for temporary services to original or better condition, or as specified.
- G. Prior to installation of material, equipment and/or other work, verify with subcontractors, material or equipment manufacturers, and installers that the substrate or surface to which those materials will attach is acceptable for installation of those materials or equipment. (Substrate is defined as any building or construction surfaces to which materials or equipment are attached to, or required prior to installation i.e., floors, walls, ceilings, soils, utilities, site grading, and backfill etc.).
- H. Correct unacceptable substrate until acceptable for installation of equipment or materials.

1.5 TEMPORARY UTILITIES

- A. Obtaining Temporary Service:
 1. Make arrangements with utility service companies for temporary services,

unless provided by Owner.

2. Abide by rules and regulations of utility service companies and/or authorities/agencies/entities having jurisdiction.
3. Be responsible for utility service costs and permits until Work is substantially complete and de-mobilization from site. Included services are fuel, power, light, heat, and any other utility services necessary for execution, completion, testing, and initial operation of Work.
4. Be responsible for providing approved metering devices, as necessary, for any temporary utilities.

B. Water:

1. Contractor to provide water required for performance of Work, specified tests of piping, equipment, devices, or other equipment, and for other uses as necessary.
2. Provide and maintain adequate supply of potable water for consumption by Contractor personnel and Owner's Representatives.
3. Provide necessary approved metering devices and backflow preventers.

C. Electricity and Lighting:

1. Provide electrical service required for Work, including testing of Work. Provide power for lighting, operation of equipment, and other use as necessary.
2. For projects on existing sites, electric power service to be provided includes temporary power service or generator(s) to maintain Owner's operations during scheduled shutdown(s). Coordinate all temporary shutdowns with Owner and Owner's Representative(s).
3. Minimum lighting level shall be ten (10) foot-candles for open areas; twenty (20) foot-candles for stairs and shops. Provide minimum of one (1) 300 watt lamp for each 200 square feet of work area.

D. Heat and Ventilation:

1. Provide temporary heat as necessary for protection or completion of Work.
2. Provide temporary heat and ventilation to assure safe working conditions. Maintain enclosed areas at minimum of 50°F.

E. Telephone:

1. Provide emergency telephone service (including call waiting and call forwarding) at Project Site for use by Contractor personnel, Owner, Owner's Representative, and others performing work or furnishing services at the site.

F. Sanitary Facilities:

1. Provide and maintain sanitary facilities for persons on job site. Comply with regulations of State and local departments of health.
2. Enforce use of sanitary facilities by construction personnel at job site. Enclose sanitary facilities. Pit-type toilets will not be permitted. No discharge will be allowed from these facilities. Collect and store sewage and waste so as not to cause nuisance or health problem. Haul sewage and waste off-site and properly dispose of in accordance with all applicable regulations.
3. Locate toilets near Work site, within 500 feet of working activities for line work projects and secluded from view as best as possible. Keep toilets clean and supplied throughout course of Work. Locate toilets a minimum of 100 feet from all water wells.

1.6 LIMITS OF CONSTRUCTION

- A. Construction operations and storage areas are limited to Owner's property, permanent easements, temporary construction easements (TCE), and/or the Limits of Construction or Construction Limits as indicated on the Contract Drawings.
- B. Unauthorized use of areas, or trespassing on land outside of defined limits, is not permitted.
- C. Make arrangements, at no cost to the Owner, for Contractor's temporary use of any private properties which may be needed by Contractor for performance of Work. Contractor and Contractor's surety shall indemnify and hold harmless the Owner and Owner's Representatives against claims or demands arising from use of properties outside the Limits of Construction. Submit notarized copy of any separately negotiated agreement(s) between private property owner(s) and Contractor prior to use of area.
- D. Where Limits of Construction are shown on Contract Drawings to extend to a property or Right-of-Way line, keep equipment, materials, and stockpiles a minimum of 5 feet from boundary, or existing fence lines.
- E. Where utility alignment is within an esplanade and Limits of Construction are shown to extend to edge of the esplanade, keep equipment, materials, and stockpiles a minimum of 5 feet from back of curb.
- F. There are unique terms and conditions associated with the various public and private easements, rights-of-entry, encroachment and crossing documents (collectively, the easement documents) which may be site specific. Contractor shall familiarize itself with all easement Documents. Easement documents are available from the Owner on a case by case basis upon request.
- G. The Contractor, at its sole expense, shall be responsible for complying with all

terms and conditions of all easement documents and the easement rights described therein for this project.

- H. Contractor shall safely, properly, and adequately assume and perform all of the duties, indemnities, responsibilities, and liabilities of the Owner under the easement documents.
- I. Contractor, at its cost, shall provide all insurance required by the easement documents. All land included within the tracts covered by the easement documents and easements described herein shall be restored to its original condition prior to Substantial Completion of the construction (including, without limitation, repair or replacement of pavement, concrete, signs, fencing, trees, sidewalks, landscaping, shrubbery, and grass) unless otherwise specified in the Contract Documents.

1.7 STORAGE SHEDS AND BUILDINGS

- A. Provide adequately ventilated, watertight storage facilities with floor above ground level for protection of materials and equipment susceptible to weather damage.
- B. Store materials in neat and orderly manner. Store materials and equipment to permit easy access for identification, inspection, and inventory.
- C. Storage of materials not susceptible to weather damage may be on blocks off ground.
- D. Storage of all fuels and chemicals shall be in designated areas by Contractor.
- E. Refer to Specification Section 01 65 50 – Product Delivery, Storage, and Handling for additional requirements.
- F. Fill and grade site for temporary structures to provide positive drainage away from Work area, but not to impact adjacent property owners.
- G. Avoid obstructing drainage ditches or inlets. When obstruction is unavoidable due to requirements of Work, provide grading and temporary drainage structures to maintain unimpeded drainage flow. Failure of the Contractor to maintain proper site drainage shall prohibit it from making a claim against the Owner for monetary or time damages due to drainage impacts.

1.8 WORKING TIMES

- A. Construction shall be conducted during working hours as indicated in Specification Section 00 72 00 – General Conditions of the Contract, unless otherwise amended by a supplemental specification or agreement to the General Conditions of the Contract, and approved by Owner.

1.9 SITE ACCESS TIMES

- A. Contractor to coordinate all site access, including deliveries, outside of working

hours with Owner's Representative. Neither Owner nor Owner's Representatives shall sign for any Contractor deliveries. Refer to Specification Section 01 65 50 – Product Delivery, Storage, and Handling.

- B. Contractor shall coordinate with Owner to not interfere with Owner's facility operations.

1.10 NOTIFICATION OF ADJACENT OCCUPANTS

- A. Notify individual occupants in areas to be affected by Work of proposed construction activities and schedule using a standardized notification form letter and/or door hanger. Notification shall be made not less than 72 hours or more than 2 weeks prior to performance of work within 200 feet of homes or businesses. Coordinate all notifications with Owner's Representative.
- B. Include in notification the names and telephone numbers of two Contractor representatives for resident contact available on 24-hour call. Describe precautions that Contractor will take to protect private property and identify potential inconveniences and disruptions to resident's access and utilities.
- C. For Contractor's convenience, Owner's Representative will provide an example notice at the pre-construction meeting. In addition to other requirements of this specification regarding notification to adjacent occupants, Contractor's notice is generally to follow the form and content of the example notice.
- D. Submit proposed notification(s) to Owner for approval prior to distribution. Provide notice(s) in languages as appropriate (i.e., double sided notice. Notice on one side shall be written in English and flip side shall be written in Spanish).

1.11 SAFETY REQUIREMENTS

- A. Beware of overhead power lines existing in area and in close proximity to project. When 10 feet of clearance between energized overhead power line and construction-related activity cannot be maintained, submit a request to the appropriate utility provider to de-energize or move conflicting overhead power line(s).
- B. Submit Contractor's Safety Program in accordance with Specification Section 01 33 00 – Submittals. Include Site Safety and Site Security in accordance with Specification Section 00 72 00 – General Conditions of the Contract. Include documented response to trench safety requirements as specified in Specification Section 00 31 32.10 – Trench Safety Geotechnical Information.
- C. Conduct operations in strict accordance with the Contractor's Safety Program, in accordance with applicable Federal, State, and local safety codes and statutes, and with good construction practice. Establish and maintain procedures for safety of all work, personnel, and equipment involved in Project.
- D. Observe and comply with Texas Occupational Safety Act (Art. 5182a, V.C.S.) and with all safety and health standards promulgated by Secretary of Labor

under Section 107 of Contract Work Hours and Standards Act, published in 29 CFR Part 1926 and adopted by Secretary of Labor as occupational safety and health standards under Williams-Steiger Occupational Safety and Health Act of 1970, and to other legislation enacted for safety and health of Contractor employees. Safety and health standards apply to subcontractors and their employees as well as to Contractor and its employees.

- E. Observance of and compliance with regulations is solely and without qualification responsibility of Contractor without reliance or superintendence of or direction by the Owner or Owner's Representative. Immediately advise Owner's Representative of investigation or inspection by Federal Safety and Health Inspectors of Contractor or subcontractor's work or place of work on job site under this Contract, and after investigation or inspection, advise Owner's Representative of results. Submit one copy of accident reports to Owner's Representative within 10 days of occurrence.
- F. Protect areas occupied by workmen using best available devices for detection of lethal and combustible gases. Test devices frequently to assure functional capability. Constantly observe infiltration of liquids into Work area for visual or odor evidences of contamination, and immediately take appropriate steps to seal off entry of contaminated liquids into Work area.
- G. Implement safety measures, including but not limited to safety personnel, first-aid equipment, ventilating equipment, and other safety equipment, as specified or detailed on the Contract Drawings.
- H. Maintain required coordination with Police and Fire Departments during entire period covered by Contract.
- I. In safety plan, include project safety analysis. Itemize major tasks and potential safety hazards. Plan to eliminate hazards or protect workers and public from each hazard.

1.12 FIRST AID EQUIPMENT

- A. Provide first aid kit throughout construction period. List telephone numbers for hospitals, and ambulance services in each first aid kit.
- B. Have at least one person thoroughly trained in first aid and cardiopulmonary resuscitation (CPR) procedures present on site whenever Work is in progress. Contractor to conform to protocols and requirements for training and protection against "blood borne pathogens."

1.13 FIRE PROTECTION

- A. Conform to specified fire protection and prevention requirements established by Federal, State, or local governmental agencies and as provided in Contractor's Safety Program.

1.14 SECURITY MEASURES

- A. Protect all Work materials, equipment, and property from loss, theft, damage, and vandalism. Perform duty to protect property of the Owner used in connection with performance of Work.
- B. If existing fencing or barriers are breached or removed for purposes of construction, provide and maintain temporary security fencing equal to existing.

1.15 PROTECTION OF UTILITIES, PIPELINES, AND PROPERTY

- A. Utilize Utility Coordinating Committee One Call System (telephone number, (713) 223-4567), which must be called 48 hours in advance to locate utilities. Toll free telephone number is 1-800-669-8344, Texas (Lone Star) One Call System.
- B. Prevent damage to existing utilities during construction. Utilities shown on Drawings are at approximate locations. Pre-locate, by whatever means may be required (metal detection equipment, probes, excavation, survey), underground utilities before excavating in accordance with the Critical Locations investigation described in Specification Section 31 21 33 – Trenching, Backfilling and Compacting for Utilities. Perform investigative work and repairs required after investigation. Contractor is responsible for damages caused by failure to locate and preserve these underground utilities. Give owners of utilities a minimum of five (5) days' notice before commencing Work in area, for locating utilities during construction and for making adjustments or relocation of utilities when they conflict with proposed Work. Include cost for temporary relocation of utilities necessary to accommodate construction in unit costs for utility construction unless otherwise noted on Drawings. Bypassing of sanitary waste to storm drainage facilities is not allowed. Utility service laterals are not shown on Drawings. Contractor shall anticipate that service lines exist and repair them when damaged due to construction activity. No separate payment will be made for repair work. Include payment in unit prices for work in appropriate sections.
- C. Contractor shall adhere to each privately owned and operated utility company's construction guidelines when working adjacent-to or across each such entities wet or dry utility.
- D. Prior to abandonment of any utility indicated on the Drawings, make arrangements with Owner's Representative and utility owner to terminate service, remove meters, valves, appurtenances, transformers, and/or poles, as required.
- E. Utility Outages and Shutdowns: Provide a notification to the Owner's Representative and private utility companies (when applicable) a minimum of 48 hours, excluding weekends and holidays, in advance of required utility shutdown. Shutdown planning and coordination activities shall commence a

minimum of 2-weeks prior to scheduled shutdown. Coordinate all work as required.

- F. Protect and prevent damage to existing crossing, parallel, and adjacent pipelines during construction in accordance with Specification Section 01 11 13 – Work Covered by Contract Documents.
- G. When excavating near product pipelines and prior to start of excavation, request that representative of pipeline company come to the construction site(s) to meet representatives of Contractor and Owner's Representative to discuss actual procedures that will be used. Request that pipeline company's representative probe and locate pipelines in at least three locations: one at each side of proposed excavation and one at centerline of proposed Work. Representative of the pipeline company and Owner's Representative must be present to observe activities of Contractor at all times when excavation is being conducted within 15 feet of existing pipelines.
- H. Protection of the Work, and Public and Private Property
 - 1. Take precautions, provide programs, and take actions necessary to protect the Work, and public and private property from damage.
 - 2. Do not alter condition of properties adjacent to and along Limits of Construction.
 - 3. Do not use ways, means, methods, techniques, sequences, or procedures that result in damage to adjacent properties or improvements.
 - 4. Restore properties damaged by Contractor outside of designated Limits of Construction at no cost to Owner.
 - 5. Take action to prevent damage, injury, or loss, including, but not limited to, the following:
 - a. Store materials, supplies, and equipment in orderly, safe manner that will not interfere with progress of Work or work of others.
 - b. Provide suitable storage for materials subject to damage by exposure to weather, theft, breakage, or otherwise.
 - c. Place upon Work or any part thereof only safe loads.
 - d. Frequently clean up refuse, rubbish, scrap materials, and debris created by construction operations, keeping Project site safe and orderly.
 - e. Provide safe barricades and guard rails to protect pedestrian and vehicular traffic around openings, scaffolding, temporary stairs and ramps, excavations, elevated walkways, and other hazardous areas.
 - 6. Assume full responsibility for preservation of public and private property on or adjacent to the Limits of Construction. When direct or indirect damage is

done by or on account of any act, omission, neglect, or misconduct in execution of Work by Contractor, restore to condition equal to or better than that existing before damage was done.

7. Perform daily clean up in affected construction areas in order to restore site to existing or better conditions. Areas should be free of debris, scrap material, dirt, mud, and other items identified by Owner's Representative. Do not leave buildings, roads, streets, or other construction areas unclean. If deemed necessary by the Owner's Representative, Contractor shall employ street sweeping/cleaning equipment to maintain area streets.

I. Barricades and Warning Signals:

1. Where Work is performed on or adjacent to any roadway, right-of-way, or public place, furnish and erect barricades, fences, lights, warning signs, and danger signals, and take other precautionary measures, for protection of persons or property and of the Work.
2. Paint barricades to be visible at night. From sunset to sunrise, furnish and maintain at least one light at each barricade.
3. Erect sufficient barricades to keep vehicles and pedestrians from entering the area under construction.
4. Maintain barricades, signs, lights and provide watchmen until Project is accepted by the Owner or the site has been completely restored to its preconstruction condition.
5. Whenever Work creates encroachment on public roadways, station flagmen to manage traffic flow in accordance with approved traffic control plan. Refer to Specification Section 01 55 26 – Traffic Control.

J. Protection of Existing Structures:

1. Underground Structures:
 - a. Underground structures are defined to include, but not be limited to, sewer, water, gas, and other piping, manholes, boxes, chambers, electrical signal and communication conduits, tunnels, and other existing subsurface installations located within or adjacent to limits of Work.
 - b. Known underground structures including water, sewer, electric, and telecommunication services are shown on Contract Drawings. This information is not guaranteed to be correct or complete.
 - c. Explore ahead of trenching and excavation work and sufficiently uncover obstructing underground structures to determine their location, to prevent damage to them, and to prevent interruption of utility services. Restore underground structures to original conditions at no additional cost if damaged during construction.

- d. Locate and protect private lawn sprinkler systems which may exist within site. Repair or replace damaged systems to condition existing at start of Work, or better.
 - e. Necessary changes in location of Work may be made by the Owner to avoid unanticipated underground structures.
 - f. If permanent relocation of underground structures or other subsurface installations is required and not otherwise provided in Contract, the Owner will direct Contractor in writing to perform Work, which is paid for under provisions for changes as described in Specification Section 00 72 00 - General Conditions of the Contract.
2. Surface Structures: Surface structures are defined as existing buildings, structures and other constructed installations above ground surface. Included with structures are their foundations and any extensions below the surface. Surface structures include, but are not limited to buildings, tanks, walls, bridges, roads, dams, channels, open drainage, piping, poles, wires, posts, signs, markers, curbs, walks, guard cables, fencing, and other facilities visible above ground surface.
3. Existing Condition Survey: Contractor shall survey and adequately document the condition and elevation of existing structures adjacent to the proposed alignment.
4. Protection of Underground and Surface Structures:
- a. Support in place and protect from direct or indirect damage underground and surface structures located within or adjacent to limits of Work.
 - b. Prevent overstress or damage to any structure and any part or member of structures during construction. This applies to new and existing facilities, utilities, and structures affected by construction operations. Contractor shall monitor and record the effect of its construction operations on new and existing facilities, utilities, and structures, and shall provide engineered temporary supports and connections as required to assure the safety and stability of the structures and prevent overstress of any part. Employ a registered Professional Engineer licensed in the State of Texas to design temporary supports to assure safety and integrity of structures and facilities.
 - c. Install temporary supports carefully and as required by party owning or controlling structure. Before installing structure supports, satisfy Owner's Representative that methods and procedures have been approved by owner of structure.
 - d. Avoid moving or changing property of public utilities or private corporations without prior written consent of responsible official of that

service or public utility. Representatives of these utilities reserve the right to enter within limits of this Project for purpose of maintaining their properties, or of making changes or repairs to their property that may be considered necessary by performance of this Contract.

- e. Notify owners and/or operators of utilities and pipelines adjacent to the Work of the nature of construction operations and dates when operations will be performed. When construction operations are required in immediate vicinity of existing structures, pipelines, or utilities, give minimum of 5 working days advance notice. Probe and flag location of underground utilities prior to commencement of excavation. Keep flags in place until construction operation reaches and uncovers utility.
- f. Assume risks attending presence or proximity of underground and surface structures within or adjacent to Work including but not limited to damage and expense for direct or indirect damage caused by Contractor's Work to structure. Immediately repair damage.

K. Protection of Installed Products:

- 1. Provide protection of installed products to prevent damage from subsequent operations. Remove protection facilities when no longer needed, prior to final completion of Work.
- 2. Control traffic to prevent damage to equipment, materials, and surfaces.
- 3. Provide coverings to protect equipment and materials from damage. Cover projections, wall corners, jambs, sills, and exposed sides of openings in areas used for traffic and passage of materials in subsequent work.

1.16 SURFACE RESTORATION

- A. Restore site to the condition which existed before construction in accordance with Specification Section 01 74 23 – Restoration of Site, unless otherwise noted in Contract Documents.

1.17 TRAFFIC CONTROL AND USE OF PUBLIC RIGHTS OF WAY

- A. Comply with traffic regulation in accordance with Specification Section 01 55 26 - Traffic Control, and approved traffic control plan(s).
- B. Provide barricades and signs in accordance with Section VI of the State of Texas Manual on Uniform Traffic Control Devices.
- C. Obtain necessary permits and Owner's approval when the nature of Work requires closing an entire street. Obtaining permits required for street closure are the Contractor's responsibility. Avoid unnecessary inconvenience to abutting property owners. Avoid closing more than two (2) consecutive intersections at one time, except by permission of Owner.

- D. Notify Owner's Representative at least 48 hours prior to closing a street or street crossing. It is the Contractor's responsibility to obtain all required permits for street closures in advance.
- E. Maintain 10-foot-wide minimum access lane for emergency vehicles, including access to fire hydrants, at all times.
- F. Remove surplus materials and debris and open each 500 lineal foot length of roadway for public use when work within that length is complete.
- G. Contractor shall provide and install signs indicating entrances to businesses whose normal entry is impaired or detoured as a result of construction. Proposed signs shall be submitted to the Owner's Representative for approval prior to manufacture and installation.
- H. Final acceptance of any portion of Work is not based on return of roadway to public use.
- I. Avoid obstructing driveways or entrances to private property.
- J. Provide temporary access or complete excavation and backfill in one continuous operation to minimize duration of obstruction when excavation is required across drives or entrances.
- K. Contractor shall bear the sole responsibility for damage to existing traffic cables resulting from its construction activities. The Contractor shall be responsible for the repair of damaged traffic cables including the re-cabling of the entire intersection if required, at no additional cost to the Owner.
- L. Construct and maintain temporary detours, ramps, and/or roads to provide for normal public traffic flow when use of public roads or streets is closed by necessities of Work. Contractor shall obtain all required roadway closure or detour permits in advance of commencing the proposed temporary detour, ramps, and/or roadway Work.
- M. Provide mats or other means to prevent overloading or damage to existing roadways from tracked equipment, large tandem axle trucks or equipment that will damage existing roadway surface. Contractor shall repair or replace damaged roadway not scheduled for removal and/or replacement at no additional cost to the Owner. Repairs or replacement shall be in conformance with the roadway owner's requirements.
- N. Provide daily sweeping of hard-surface roadways to remove soils tracked onto public roadways.

1.18 CONTRACTORS ROADS AND PARKING

- A. Prevent interference with traffic on existing roads.
- B. Construct and maintain temporary access roads and parking areas.

- C. Designate temporary parking areas to accommodate Contractor's and Owner's Representative personnel. When site space is not adequate, provide additional off-site parking. Locate as approved by Owner's Representative.
- D. Minimize use by construction traffic of existing streets and driveways.
- E. Do not allow heavy vehicles or construction equipment in existing parking areas.
- F. Do not inhibit the ability of the Owner's personnel to access, operate, and maintain existing facilities during construction.

1.19 COORDINATION WITH FACILITY OWNER'S OPERATIONS

- A. Definition: A "shutdown" is when a portion of the normal operation of Owner's facility, whether equipment, systems, piping, or conduit, has to be temporarily suspended or taken out of service to perform the Work.
- B. Work that may interrupt normal operations shall be accomplished at times convenient to, and approved by Owner.
- C. Except for necessary shutdowns, perform the Work such that Owner's facilities remain in continuous satisfactory operation during the Project. Schedule and conduct the Work such that the Work does not:
 - 1. Impede Owner's production or processes,
 - 2. Create potential hazards to public health or wellbeing,
 - 3. Create potential hazards to operating equipment and personnel,
 - 4. Reduce the quality of Owner's facilities' product(s) or effluent, or
 - 5. Cause odors or other nuisances.
- D. Coordinate shutdowns with Owner. When possible, combine activities into a single shutdown to minimize impacts on Owner's operations and processes.
- E. Submit a shutdown plan to the Owner and Principal Architect/Engineer a
- F. After acceptance of shutdown planning submittal and prior to starting the shutdown, provide written notification to Owner of date and time each shutdown is to start. Provide written notification submitted to the Owner's Representative at least 72 hours in advance of each shutdown.
- G. Furnish at the Site, in close proximity to the shutdown and tie-in work areas, tools, equipment, spare parts and materials, both temporary and permanent, necessary to successfully complete the shutdown. Complete to the extent possible, prefabrication of piping and other assemblies prior to the associated shutdown. Demonstrate to Owner's satisfaction that Contractor has complied with these requirements before commencing the shutdown.
- H. If Contractor's operations cause an unscheduled interruption of Owner's operations, immediately re-establish satisfactory operation for Owner.

- I. Unscheduled shutdowns or interruptions of continued safe and satisfactory operation of Owner's facilities that result in fines or penalties by authorities having jurisdiction shall be paid solely by Contractor.
- J. Shutdowns of Electrical Systems: Comply with Laws and Regulations, including the National Electric Code. Contractor shall lock out and tag circuit breakers and switches operated by Owner and shall verify that affected cables and wires are de-energized to ground potential before shutdown Work is started. Upon completion of shutdown Work, remove the locks and tags and notify Owner that facilities are available for use.

1.20 CONTRACTOR'S FIELD OFFICE (NOT USED)

1.21 PRINCIPAL ARCHITECT/ENGINEER'S FIELD OFFICE (NOT USED)

1.22 PROJECT PHOTOGRAPHS

- A. Refer to Specification Section 01 32 36.01 – Project Photographs

1.23 SPECIAL CONSIDERATIONS RELATED TO ADJACENT PROPERTIES AND FACILITIES

- A. Contractor shall be responsible for negotiations of any waivers or alternate arrangements required to enable transportation of materials to the site.
- B. Maintain conditions of access road to site such that access is not hindered as the result of construction related deterioration.
 - 1. Provide daily sweeping of hard-surface roadways to remove soils tracked onto roadway.

1.24 HISTORICAL AND ARCHAEOLOGICAL SITES

- A. If, during the course of construction, evidence of deposits of historical or archeological interest are found, the Contractor shall cease operations affecting the find and shall notify Owner.
 - 1. No further disturbance of the deposits shall ensue until the Contractor has been notified by Owner that Contractor may proceed.
 - 2. Owner will issue a notice to proceed after appropriate authorities have surveyed the find and made a determination to Owner.
 - 3. Compensation to the Contractor, if any, for lost time or changes in construction resulting from the find shall be determined in accordance with changed or extra work provisions of the Contract Documents.
- B. Refer to Specification Section 00 72 00 – General Conditions of the Contract including paragraph 4.2.4.

1.25 WARRANTY (NOT USED)

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 MAINTENANCE

- A. Maintain temporary facilities in a clean, neat, and orderly manner including maintenance of all-weather surface driveway and parking areas, buildings and furnishings, and equipment or materials furnished and supplied as part of any temporary field office or storage yard for duration of Contract.
- B. Provide regular janitorial services for any temporary field office for duration of Contract. Janitorial services consist of twice weekly sweeping and mopping of floors and trash removal, weekly cleaning of restrooms, and weekly dusting of furniture and equipment.
- C. Provide soap and water, paper towels, toilet paper, cleansers, and other necessary consumables to properly maintain any temporary field office and all temporary toilet facilities.
- D. At this office, maintain complete field file of Shop Drawings, posted Drawings and Specifications, and other files of field operations including provisions for maintaining "As Built Drawings."
- E. Immediately repair damage, leaks, or defective service.
- F. Remove any field office provided under this contract from site upon acceptance of the entire work by the Owner.

3.2 OWNER TRAINING (NOT USED)

END OF SECTION

SECTION 01 25 13
PRODUCT SUBSTITUTIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. The procedure for requesting the approval of substitution of a product that is not equivalent to a product which is specified by descriptive or performance criteria or defined by reference to one or more of the following:
 - a. Name of manufacturer.
 - b. Name of vendor.
 - c. Trade name.
 - d. Catalog number.
2. Substitutions are not "or-equals".

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

C. Request for Substitution – General:

1. Base all bids on materials, equipment, and procedures specified.
2. Certain types of equipment and kinds of material are described in specifications by means of references to names of manufacturers and vendors, trade names, or catalog numbers.
 - a. When this method of specifying is used, it is not intended to exclude from consideration other products bearing other manufacturer's or vendor's names, trade names, or catalog

numbers, provided said products are "or-equals," as determined by Owner's Representative.

3. Other types of equipment and kinds of material may be acceptable substitutions under the following conditions:
 - a. Or-equals are unavailable due to strike, discontinued production of products meeting specified requirements, or other factors beyond control of Contractor; or,
 - b. Contractor proposes a cost and/or time reduction incentive to the Owner.

1.2 MEASUREMENT AND PAYMENT

- A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS (NOT USED)

1.4 QUALITY ASSURANCE

- A. In making request for substitution or in using an approved product, Contractor represents Contractor:
 1. Has investigated proposed product, and has determined that it is adequate or superior in all respects to that specified, and that it will perform function for which it is intended.
 2. Will provide same guarantee for substitute item as for product specified.
 3. Will coordinate installation of accepted substitution into Work, to include building modifications if necessary, making such changes as may be required for Work to be complete in all respects.
 4. Waives all claims for additional costs related to substitution which subsequently arise.

1.5 DEFINITIONS

- A. Product: Manufactured material or equipment.

1.6 PROCEDURE FOR REQUESTING SUBSTITUTION

- A. Substitution shall be considered only:
 1. After award of Contract.
 2. Under the conditions stated herein.
- B. Written request through Contractor only.
- C. Transmittal Mechanics:
 1. Follow the transmittal mechanics prescribed for Shop Drawings in Specification Section 01 33 00 – Submittals.

- a. Product substitution will be treated in a manner similar to "deviations," as described in Specification Section 01 33 00 – Submittals.
- b. List the letter describing the deviation and justifications on the transmittal form in the space provided under the column with the heading DESCRIPTION.
 - 1) Include in the transmittal letter, either directly or as a clearly marked attachment, the items listed in the following paragraph below.

D. Transmittal Contents:

1. Product identification:
 - a. Manufacturer's name.
 - b. Telephone number and representative contact name.
 - c. Specification Section or Drawing reference of originally specified product, including discrete name or tag number assigned to original product in the Contract Documents.
2. Manufacturer's literature clearly marked to show compliance of proposed product with Contract Documents.
3. Itemized comparison of original and proposed product addressing product characteristics including but not necessarily limited to:
 - a. Size.
 - b. Composition or materials of construction.
 - c. Weight.
 - d. Electrical or mechanical requirements.
4. Product experience:
 - a. Location of past projects utilizing product.
 - b. Name and telephone number of persons associated with referenced projects knowledgeable concerning proposed product.
 - c. Available field data and reports associated with proposed product.
5. Data relating to changes in construction schedule.
6. Data relating to changes in cost.
7. Samples:
 - a. At request of Owner's Representative.
 - b. Full size if requested by Owner's Representative.
 - c. Held until substantial completion.

- d. Owner's Representative not responsible for loss or damage to samples.

1.7 APPROVAL OR REJECTION

- A. Written approval or rejection of substitution given by the Owner's Representative, Principal Architect/Engineer, and the Owner.
- B. Owner's Representative reserves the right to require proposed product to comply with color and pattern of specified product if necessary to secure design intent.
- C. In the event the substitution is approved, the resulting cost and/or time reduction will be documented by Change Order in accordance with the General Conditions.
- D. Substitution will be rejected if:
 - 1. Submittal is not through the Contractor with his stamp of approval.
 - 2. Request is not made in accordance with this Specification Section.
 - 3. In Owner's Representative opinion, acceptance will require substantial revision of the original design.
 - 4. In the Owner's Representative opinion, substitution will not perform adequately the function consistent with the design intent.
- E. Contractor shall reimburse Owner for the cost of the Owner's Representative evaluation whether or not substitution is approved.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 26 63

CHANGE ORDERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

Procedures for processing Change Orders, including:

1. Quality Assurance.
2. Responsible Individual.
3. Documentation of Change in Contract Price and Contract Time.
4. Change Procedures.
5. Proposals and Contract Modifications.
6. Work Change Directive.
7. Change Order.
8. Execution of Change Documentation.
9. Correlation of Contractor Submittals.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Introductory Information, Proposing Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT (NOT USED)

1.3 SUBMITTALS (NOT USED)

1.4 QUALITY ASSURANCE

A. Reference Standards:

1. Equipment Rental Rates: equipmentwatch.com. Rental Rate is defined as full unadjusted base rental rate for appropriate item of construction equipment.

1.5 RESPONSIBLE INDIVIDUAL

- A. Provide letter to the Owner's Representative indicating name, title, address and contact information of individual authorized to execute change documents and who is responsible for informing others in Contractor's employ and Subcontractors of changes to the Work. Information should be provided at the

Preconstruction Conference but, no later than 10 calendar days following the Preconstruction Conference.

1.6 DOCUMENTATION OF CHANGE IN CONTRACT PRICE AND CONTRACT TIME

- A. Maintain detailed records of changes in Work. Provide full information required for identification and evaluation of proposed changes, and substantiate costs of changes in Work.
- B. Document each proposal for change in cost or time with sufficient data to allow evaluation of proposal. Provide additional information upon request of the Owner or the Owner's Representative.
- C. Proposals shall include the following minimum information:
 - 1. Quantities of items in original Proposal with additions, reductions, deletions, and substitutions.
 - 2. Quantities and cost of items in original schedule of values with additions, reductions, deletions, and substitutions.
 - 3. Provide unit prices for items not included in original Proposal with supporting information when absent from original Proposal Work.
 - 4. Justification for changes in Contract Time.
 - 5. Additional data upon request.
- D. For changes in Work performed on a time-and-materials basis, provide the following additional information:
 - 1. Quantities and description of products and equipment.
 - 2. Taxes, insurance and bonds.
 - 3. Overhead and profit as noted in Document 00 72 00 - General Conditions, Article 11.5.
 - 4. Dates, times, and by whom work was performed.
 - 5. Time records and certified copies of applicable payrolls.
 - 6. Invoices, receipts for products, rented equipment, and subcontracts, similarly documented.
- E. For changes in Work performed on a time-and-materials basis, payment for rental equipment will be as follows:
 - 1. Actual invoice cost for duration required to complete extra work without markup for overhead and profit. When extra work comprises only a portion of rental invoice where equipment would otherwise be on site, compute

- hourly equipment rate by dividing the actual monthly invoice by 176. (One day equals 8 hours and 1 week equals 40 hours.)
2. Do not exceed estimated operating costs given on equipmentwatch.com website for items of equipment. Overhead and profit will be allowed on operating cost.
- F. For changes in Work performed on a time-and-materials basis using Contractor-owned equipment, use equipmentwatch.com rates as follows:
1. Contractor-owned equipment will be paid at Rental Rate for duration of time required to complete extra work without markup for overhead and profit. Utilize lowest cost combination of hourly, daily, weekly, or monthly rates. Use 150 percent of Rental Rate for double shifts (one extra shift per day) and 200 percent of Rental Rate for more than two shifts per day. Standby rates shall be 50 percent of appropriate Rental Rate shown on equipmentwatch.com website. No other rate adjustments apply.
 2. Do not exceed estimated operating costs given on equipmentwatch.com. Overhead and profit will be allowed on operating cost. Operating costs will not be allowed for equipment on standby.

1.7 CHANGE PROCEDURES

- A. Changes to Contract Price or Contract Time can only be made by issuance of Change Order. Issuance of Work Change Directive will be formalized into a Change Order. Changes will be in accordance with requirements of the General Conditions.
- B. The Owner's Representative will advise of minor changes in Work not involving an adjustment to Contract Price or Contract Time as authorized by the General Conditions by issuing supplemental instructions.
- C. Request clarification of Drawings, Specifications, Contract Documents, or other information by using Request for Information. Response by the Owner's Representative to Requests for Information does not authorize Contractor to perform tasks outside scope of Work. Changes must be authorized as described in this section.

1.8 PROPOSALS AND CONTRACT MODIFICATIONS

- A. The Owner or the Owner's Representative may issue a Request for Proposal (RFP), which includes detailed description of proposed change with supplementary or revised Drawings and Specifications. The Owner or the Owner's Representative may also request a proposal in response to a Request for Information. Prepare and submit proposal within 7 days or as specified in the request.
- B. Submit request for Contractor changes to Owner's Representative describing proposed change and its full effect on Work, with a statement describing reason

for change and effect on Contract Price and Contract Time including full documentation.

C. The Owner may use the Principal Architect/Engineer to review Change Orders.

1.9 WORK CHANGE DIRECTIVE

- A. The Owner may issue a signed Work Change Directive instructing Contractor to proceed with a change in Work. Work Change Directive will subsequently be incorporated in Change Order.
- B. Document will describe changes in Work and designate method of determining change in Contract Price or Contract Time.
- C. Proceed promptly to execute changes in Work in accordance with Work Change Directive.

1.10 CHANGE ORDER

- A. Stipulated Price Change Order
 - 1. Stipulated Price Change Order will be based on accepted proposal.
- B. Unit Price Change Order
 - 1. Where Unit Prices for affected items of Work are included in Proposal, unit price Change Order will be based on unit prices, subject to the General Conditions.
 - 2. Where unit prices of Work are not pre-determined in Proposal, Work Change Directive or accepted proposal will specify unit prices to be used.
- C. Time-and-Material Change Order
 - 1. Provide itemized account and supporting data after completion of change, within time limits indicated for claims in the General Conditions.
 - 2. The Owner will determine change allowable in Contract Price and Contract Time as provided in the General Conditions.
 - 3. Maintain detailed records of work done on time-and-material basis as specified in paragraph 1.4, Documentation of Change in Contract Price and Contract Time.
 - 4. Provide full information required for evaluation of changes and substantiate costs for changes in Work.

1.11 EXECUTION OF CHANGE DOCUMENTATION

- A. The Owner or the Owner's Representative will issue Change Orders, Work Change Directives, or accepted proposal for signatures of parties as described in the General Conditions.

1.12 CORRELATION OF CONTRACTOR SUBMITTALS

- A. For Stipulated Price Contracts, promptly revise Schedule of Values and Application for Payment forms to record authorized Change Orders as separate line item.

- B. For Unit Price Contracts, next monthly estimate of Work after acceptance of a Change Order will be revised to include new items not previously included and appropriate unit rates.
- C. Promptly revise progress schedules to reflect change in Contract Time, and to adjust time for other items of work affected by change, and resubmit for review.
- D. Promptly enter changes to on-site and record copies of Drawings, Specifications, or Contract Documents.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 29 73
SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Measurement and Payment
 - 2. Definition
 - 3. Preparation
 - 4. Submittal
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 – Introductory Information, Proposing Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

- A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS

- A. Submit Schedule of Values in accordance with requirements of Section 01 33 00 – Submittals. Submit at least 10 days prior to submitting first application for progress payment. Submit via SharePoint.
- B. Revise Schedule of Values and resubmit for items affected by contract modifications, Change Orders, and Work Change Directives. After changes are reviewed without exception by Authority's Principal Architect/Engineer, make submittal at least 10 days prior to submitting next application for progress payment.

1.4 DEFINITIONS

- A. Schedule of Values: Is a schedule, prepared and maintained by the Contractor, allocating portions of the Contract Amount to various portions of the Work, including a tabulation of all of the costs of the various Subcontracts and materials which in the aggregate make up the Cost of the Work. The Schedule of Values shall be subject to Owner's approval and, after such approval, be used as the basis for reviewing the Contractor's Application For Payment.
- B. Break down costs to list major products or operations for each line item which has an installed value of more than \$5000.

1.5 PREPARATION

- A. For stipulated price contracts, subdivide Schedule of Values into logical portions of Work, such as major work items or work in contiguous geographic areas.
- B. Schedule and Schedule of Values shall be developed together. At a minimum, the Schedule of Values shall be broken out by trade and split between materials and labor as approved by the Owner. Such Prices will include overhead and profit applicable to each item of work.
- C. For lump sum equipment items where submittal of operation/maintenance data and testing are required, include separate item for equipment operation and maintenance data submittal valued at 5 percent of lump sum amount for each equipment item and separate item for testing and adjusting valued at 5 percent of lump sum amount for each equipment item.
- D. Round off figures for each listed item to nearest \$100 except for value of one item, when necessary, to make total of items in Schedule of Values equal Contract Price for stipulated price contracts or lump sum amount in Schedule of Unit Price Work.
- E. Submit Schedule of Values in approved electronic spreadsheet, formatted to print on 11" x 17" paper, to the Owner's Document Management System.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 32 16

CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Specific requirements for the preparation, submittal, updating, status reporting and management of the construction Progress Schedule.
- B. Provide Construction Schedules for Work included in Contract in accordance with requirements in this Section. Create Construction Schedule using Critical Path Method (CPM) computer software capable of mathematical analysis of Precedence Diagramming Method (PDM) plans. Provide printed activity listings and bar charts in formats described in this Section.
- C. Combine activity listings and bar charts with narrative report to form Construction Schedule submittal for Owner and the Owner's Representatives.
- D. Related Specification Sections include, but are not necessarily limited to:
 - 1. Division 00 - Bidding Requirements, Contract Forms and Conditions of the Contract.
 - 2. Division 01 - General Requirements.

1.2 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for this item. Include the cost of construction scheduling in overhead cost for this project.

1.3 SCHEDULING STAFF

- A. Employ or retain services of individual experienced in critical path scheduling for duration of Contract. Individual shall cooperate with Owner's Representative

and shall update schedule (Progress Schedule) monthly as required by the Contract's General Conditions, to indicate current status of Work.

1.4 QUALITY ASSURANCE

- A. The person preparing and revising the construction Progress Schedule shall be experienced in the preparation of schedules of similar complexity.
- B. Within five (5) days from award of the Contract, Contractor shall submit to Owner's Representative the name of the person responsible for the preparation, maintenance, updating and revision of all schedules.
 - 1. Qualifications necessary:
 - a. At least five (5) years verifiable experience in the preparation and updating of complex construction schedules for projects of similar type, size and complexity.
 - b. Proficient in the use of Microsoft® Project® 2007.

1.5 DEFINITIONS

- A. The following definitions shall apply to this Specification Section:
 - 1. **BASELINE SCHEDULE:** The initial as-bid, detailed, cost and resource loaded Progress Schedule prepared by the Contractor to define its plan for constructing the Project as required by the Contract Documents, and accepted by the Owner or Owner's Representative as meeting the requirements of the Contract Documents for specified constraints, sequences, milestones and completion dates.
 - 2. **PROGRESS SCHEDULE:** The initially accepted Baseline Schedule, or subsequently approved Revised Baseline Schedules, updated each month to reflect actual start and finish dates of schedule activities and all time impact events whether caused by Contractor or Owner or factors beyond the control of either party.
 - 3. **REVISED BASELINE SCHEDULE:** The initially accepted Baseline Schedule revised to reflect only approved changes.
 - 4. **WORKING SCHEDULE:** A schedule developed from the Progress Schedule, utilizing scheduling software features not allowed for Baseline and Progress Schedules at the Contractor's sole discretion, to indicate the Contractor's plan for executing the Work, and providing for schedule recovery when approved time extensions are not sufficient to provide for

timely completion due to Contractor inefficiencies beyond the control of the Owner or outside the risks accepted by the Owner.

1.6 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
2. Baseline Schedule: Submitted within 20 days after Effective Date of Agreement.
3. Monthly Progress Schedules.
4. Revised Baseline Schedules.
5. Working Schedules.
6. Look-Ahead Schedules.

1.7 GENERAL REQUIREMENTS

A. Contractor shall prepare and submit Baseline and Progress Schedules and updates and revisions to them as specified herein.

1. All scheduling to be performed in Microsoft® Project® 2007.
2. The Baseline and Progress Schedules shall be a calendar day-based and cost-loaded Critical Path Method (CPM) network diagram with supporting data.

B. Disallowed Scheduling Software Features:

1. The following specific features are not allowed to be applied in the Baseline and Progress Schedules:
 - a. Resource leveling.
 - b. Activity or event constraints, other than those specified by the Contract Documents.
 - c. Leads and lags:
 - 1) Create specific activities with specific durations in-lieu-of leads and lags.
 - 2) Durations shall have positive values.
 - d. Default progress data:
 - 1) Start and finish dates shall not be automatically updated.
 - 2) Update with actual start and finish dates documented from field reports.
 - 3) Work activities shall be updated by actual Work progression, not cash flow driven.

- 4) Updating of activity percent complete and remaining duration shall be independent functions, not one parameter calculated from the other.
 - 5) Out-of-sequence progress shall be accounted for through retained logic, not a default option of progress override.
 - e. Multiple calendars.
 2. Any float suppression techniques or other software features that corrupts the pure mathematical model calculating the critical path.
 - a. The following CPM schedule outputs will be rejected without further review:
 - 1) Schedules indicating the start of the critical path at a date point or activity beyond the date of Notice to Proceed, or schedules indicating a discontinuous critical path from Notice to Proceed to Contract completion.
 - 2) Schedules defining critical activities as those on a path or paths having some minimum value of float.
 - 3) Schedules with multiple critical paths.
 - 4) Schedules indicating a completion date beyond the contractual completion date.
 3. Contractor, at Contractor's sole discretion, may employ the disallowed scheduling software features for Contractor's exclusive use in preparing a Working Schedule.
- C. Float Time:
1. Neither the Owner nor the Contractor owns the float; the project owns the float.
 2. As such, liability for delay of the project completion date rests with the party actually causing delay to the project completion date.
- D. By preparing and submitting the Baseline Schedule, the Contractor represents that it can and intends to execute the Work and portions thereof within the

specified times and constraints and that its bid covers the costs associated with the execution of the Work in accordance with the Construction Schedule.

- E. Contractor shall provide an electronic copy on CD media for the Baseline Schedule and Progress Schedule and all monthly updates of both to accompany hard copies of the schedules and tabular reports.
 - 1. Electronic submittal shall be in a format compatible with Microsoft® Project® 2007.
 - 2. Contractor shall provide with the schedules, a procedural outline of the system shut-downs and proposed tie-ins, and the Owner's O&M staff, which shall be subject to approval of the Owner.

1.8 SUBMITTAL PACKAGES

- A. Baseline Schedule:
 - 1. CPM time-scaled network diagram:
 - a. Via Sharepoint®
- B. Monthly updates that include the following:
 - 1. Revised Baseline Schedule as appropriate.
 - a. Update to reflect approved Change Orders occurring since the prior update.
 - 2. Updated Progress Schedule.
 - 3. Explanation of changes in logic, duration of activities.
 - 4. Upload electronic version (pdf) to SharePoint.
- C. Look-Ahead Rolling Schedule:
 - 1. A four-week rolling schedule shall be provided by the Contractor at each progress meeting.
 - a. The schedule shall provide an accurate representation of the work performed the previous week and work planned for the current week and subsequent two (2) weeks.
 - 2. The schedule shall be provided in a tabular format with bars representing work duration.
 - a. The schedule shall refer to activity ID numbers on the Baseline and Progress Schedules.
 - b. Activities that are on the critical path and activities that are behind schedule shall be noted by color, highlight, or underscore.
 - 3. Derived from the Working Schedule, if applicable.

1.9 BASELINE SCHEDULE

- A. Schedule shall include, but not be limited to, activities that show the following that are applicable to the project:

1. Project characteristics, salient features, or interfaces, including those with outside entities that could affect time of completion.
 2. Project start date, scheduled completion date and other milestones.
 3. Work performed by Contractor, subcontractors and suppliers.
 4. Submittal development, delivery, review and approval, including those from Contractor, subcontractors and suppliers.
 5. Procurement, delivery, installation and testing of materials, plants and equipment.
 6. Testing and settlement periods.
 7. Utility notification and relocation.
 8. Erection and removal of falsework and shoring.
 9. Finish work and final cleanup.
 10. Project float as the predecessor activity to the scheduled completion date.
- B. Schedule shall have not less than 15 activities, unless otherwise authorized by the Owner's Representative.
1. The number of activities shall be sufficient to assure adequate planning of the project, to permit monitoring and evaluation of progress, and to do an analysis of time impacts.
 2. Schedule activities shall include the following:
 - a. A clear and legible description.
 - b. Start and finish dates.
 - c. A duration of not less than one (1) working day, except for event activities, and not more than 10 working days, unless otherwise authorized by the Owner's Representative.
 - d. At least one (1) predecessor and one (1) successor activity, except for project start and finish milestones.
 - e. Required constraints: Only contractually required constraints may be inserted into the Baseline Schedule.
 - f. Codes for responsibility, stage, work shifts, location and contract pay item
- C. Working durations shall be planned to incorporate the effects of normal weather impacts. See General Conditions Article 12.2 for the "Baseline Rain Day Determination.

1.10 PROGRESS SCHEDULE

- A. Develop Progress Schedule based on approved Baseline and Revised Baseline Schedules.
1. All restrictions on use of constraints, leads and lags, resource leveling, etc., shall also apply to Progress Schedules.

- B. The Progress Schedule will be updated once per month for monitoring progress.
 - 1. Contractor may submit one (1) additional update per month for its own convenience.
- C. Indicate progress by making entries on the most recently accepted version of the network diagram and supporting data to show:
 - 1. Activities completed.
 - 2. Activities started.
 - 3. Remaining duration for each activity started but not yet completed.
 - 4. Percent complete based on value of work in place and value of equipment or material delivered and properly stored.
 - 5. Status of activity due to be completed by the next scheduled progress meeting.
- D. Computerized Progress Schedule and percent completion of Work shall be used to verify Contractor's payment requests.
 - 1. Progress payments will not be processed by the Owner's Representative unless the updated Progress Schedule has been submitted concurrently with a pay request and found acceptable by the Owner's Representative.

1.11 REVISIONS TO PROGRESS SCHEDULE

- A. Contractor shall submit data for a revised Progress Schedule within five (5) days of the occurrence of any of the following:
 - 1. When contractor-caused delay in completion of any activity or group of activities indicates an overrun of the Contract Time or Control Dates by 30 working days or 10 percent of the remaining duration, whichever is less.
 - 2. When delays in submittals, deliveries, or work stoppages are encountered making necessary the replanning or rescheduling of the Work.
 - 3. When the schedule does not represent the actual progress of the Work.
 - 4. When a change order significantly affects the contract completion date.
- B. The revised Progress Schedule shall be the basis of a Working Schedule showing:
 - 1. How Contractor intends to return to schedule.
 - 2. How Contractor intends to avoid falling behind schedule on future activities.
- C. Show changes on the network diagram and supporting data including:
 - 1. New activities and their duration.
 - 2. Modifications to existing activities.
- D. Provide written narrative report as needed to define:

1. Problem areas, anticipated delays, and impact on the current schedule.
 2. Corrective action recommended, and its effect.
 3. Major changes in scope.
 4. Revised projections of progress and completion.
- E. Except as provided in the following subparagraphs 1 and 2, the cost of revisions to the Progress Schedule resulting from changes in the Work shall be included in the cost for the change in the Work, and shall be based on the complexity of the revision or Change Order, man-hours expended in analyzing the change, and the total cost of the change.
1. The cost of revision to the Construction Schedule not resulting from authorized changes in the Work shall be the responsibility of the Contractor.
 2. The cost of revision to the Construction Schedule for the Contractor's convenience shall be the responsibility of the Contractor.
- F. The revised network diagram and supporting data for the Progress Schedule shall be submitted to the Owner's Representative upon completion of the revisions, but not later than the next progress meeting.
- G. Revisions to the Progress Schedule for the Contractor's convenience:
1. Must be approved by the Owner's Representative before Contractor changes the sequence of Work.

1.12 TIME IMPACT ANALYSIS (TIA)

- A. The accepted initial Baseline Schedule or subsequently accepted Revised Baseline Schedule shall be used for TIA.
- B. Contractor shall submit a written TIA to the Owner's Representative with each request for adjustment of Contract Time, or when Contractor or Owner's Representative consider that an approved or anticipated change may impact the critical path or contract progress.
1. The TIA must be attached to any change order prior to approval of any change to time or cost.
- C. The TIA shall illustrate the impacts of each change or delay on the current scheduled completion date or internal milestone, as appropriate.
1. The analysis shall use the Baseline or Revised Baseline Schedule (accepted Baseline Schedule) that has a data date closest to and prior to the event.
 2. If the Owner's Representative determines that the accepted Baseline Schedule used does not appropriately represent the conditions prior to the event, the accepted Baseline Schedule shall be updated to the day before the event being analyzed.
 3. The TIA shall include an impact schedule developed from incorporating the event into the accepted Baseline Schedule by adding or deleting activities,

- or by changing durations or logic of existing activities as appropriate to the nature of the change event.
4. If the impact schedule shows that incorporating the event modifies the critical path and scheduled completion date of the accepted Baseline Schedule, the difference between scheduled completion dates of the two (2) schedules shall be equal to the adjustment of Contract Time.
- D. Contractor shall submit a TIA in duplicate within 15 working days of receiving a written request for a TIA from the Owner's Representative.
1. Contractor shall allow the Owner's Representative two (2) weeks after receipt to approve or reject the submitted TIA.
 2. All approved TIA schedule changes shall be shown on the next update schedule.
- E. In the event of a TIA rejection:
1. If a TIA submitted by the Contractor is rejected by the Owner's Representative, the Contractor shall meet with the Owner's Representative to discuss and resolve issues related to the TIA.
 2. If agreement is not reached, the Contractor will be allowed 15 days from the meeting with the Owner's Representative to give notice.
 3. Contractor shall only show actual as-built work, not unapproved changes related to the TIA, in subsequent update schedules.
 4. If agreement is reached at a later date, approved TIA schedule changes shall be shown on the next update schedule.
 5. Owner's Representative will withhold remaining payment on the schedule contract item if a TIA is requested by Owner's Representative and not submitted by Contractor within 15 working days.
 6. The schedule item payment will resume on the next estimate after the requested TIA is submitted.
 - a. No other contract payment will be retained regarding TIA submittals.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 32 36.01

PROJECT PHOTOGRAPHS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Technical and submittal requirements for project photographs, including:
 - a. Measurement and Payment

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 - General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 DEFINITIONS:

1. Pre-construction Photographs: Photographs taken, in sufficient numbers and detail, prior to beginning field activities, to show original construction site conditions.

1.4 SUBMITTALS:

1. Refer to Section 01 33 00 – Submittals.
2. Format and Media. Digital photography shall be used for Preconstruction and Progress Photographs.
 - 1) Digital Photography. Use at least 6.0 megapixel density for photographs. Submit digital photographic files on compact disks (CD) in JPEG format. Submit disks in 3-hole punched plastic sheets with a maximum of two CD's per sheet. Mark disks with project name and dates of photos.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 33 00

SUBMITTALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Mechanics and administration of the submittal process for:
 - a. Shop Drawings.
 - b. Samples.
 - c. Miscellaneous submittals.
 - d. Operation and Maintenance Manuals.
2. General content requirements for Shop Drawings.
3. Content requirements for Operation and Maintenance Manuals.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 - General Requirements.
3. Sections in Divisions 02 through 48 identifying required submittals.

1.2 MEASUREMENT AND PAYMENT

- A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS (NOT USED)

1.4 DEFINITIONS

A. Shop Drawings:

1. See General Conditions.
2. Product data and samples are Shop Drawing information.

B. Operation and Maintenance (O&M) Manuals:

1. Contain the information required for proper installation and maintenance of building materials and finishes.
2. Contain the technical information required for proper installation, operation and maintenance of process, electrical and mechanical equipment and systems.

C. Miscellaneous Submittals:

1. Submittals other than Shop Drawings and O&M Manuals.

2. Representative types of miscellaneous submittal items include but are not limited to:
 - a. Construction schedule.
 - b. Facility Shutdown Plan(s)
 - c. HVAC test and balance reports.
 - d. Installed equipment and systems performance test reports.
 - e. Manufacturer's installation certification letters.
 - f. Instrumentation and control commissioning reports.
 - g. Warranties.
 - h. Service agreements.
 - i. Construction photographs.
 - j. Record Documents.
 - k. Cost breakdown (Schedule of Values).
 - l. Safety Plan(s).

1.5 SUBMITTAL SCHEDULE

- A. Schedule of Shop Drawings:
 1. Submitted and approved within 20 days of receipt of Notice to Proceed.
 2. Account for multiple transmittals under any specification section where partial submittals will be transmitted.
- B. Shop Drawings: Submittal and approval prior to 50 percent completion.
- C. Operation and Maintenance Manuals and Completed Equipment Record Sheets: Initial submittal within 60 days after date Shop Drawings are approved.

1.6 PREPARATION OF SUBMITTALS

- A. General:
 1. All submittals and all pages of all copies of a submittal shall be completely legible.
 2. Submittals which, in the Owner's Representative's or Principal Architect/Engineer's sole opinion, are illegible will be returned without review.
- B. Shop Drawings:
 1. Scope of any submittal and shop drawing transmittal:
 - a. Submit shop drawings utilizing Owner's standard Submittal Transmittal Form.
 - b. Limited to one (1) Specification Section.

- c. Do not submit under any Specification Section entitled (in part) "Basic Requirements" unless the product or material submitted is specified, in total, in a "Basic Requirements" Section.
- 2. Numbering letter of transmittal:
 - a. Include a series number, "xx", beginning with "01" and increasing sequentially with each additional transmittal.
 - b. Assign consecutive series numbers to subsequent transmittals.
- 3. Describing transmittal contents:
 - a. Provide listing of each component or item in submittal capable of receiving an independent review action.
 - b. Identify for each item:
 - 1) Manufacturer and Manufacturer's Drawing or data number.
 - 2) Contract Document tag number(s).
 - 3) Unique page numbers for each page of each separate item.
 - 4) Use divider sheets with labeled tabs to separate independent items within a single submittal.
 - c. When submitting "or-equal" items that are not the products of named manufacturers, include the words "or-equal" in the item description.
- 4. Contractor stamping:
 - a. General:
 - 1) Contractor's review and approval stamp shall be applied either to the letter of transmittal or a separate sheet preceding each independent item in the submittal.
 - a) Contractor's signature and date shall be wet ink signature. Is an electronic signature acceptable as most submittals are uploaded to SharePoint as a .PDF electronic document?
 - b) Shop Drawing submittal stamp shall read "(Contractor's Name) has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval as stipulated under General Conditions Paragraph 6.20.4."
 - 2) Submittals containing multiple independent items shall be prepared with an index sheet for each item listing the discrete page numbers for

each page of that item, which shall be stamped with the Contractor's review and approval stamp.

- a) Individual pages or sheets of independent items shall be numbered in a manner that permits Contractor's review and approval stamp to be associated with the entire contents of a particular item.
- b) Use divider sheets with labeled tabs to separate independent items within a single submittal.

b. Electronic stamps:

- 1) Contractor may electronically embed Contractor's review and approval stamp to either the Submittal Transmittal Form or a separate index sheet preceding each independent item in the submittal.
- 2) Contractor's signature and date on electronically applied stamps shall be wet ink signature. Is an electronic signature acceptable as most submittals are uploaded to SharePoint as a PDF electronic document?

5. Resubmittals:

- a. Number with original root number and a suffix letter starting with "A" on a new Submittal Transmittal Form.
- b. Do not increase the scope of any prior transmittal.
- c. Account for all components of prior transmittal.
 - 1) If items in prior transmittal received "A" or "B" Action code, list them and indicate "A" or "B" as appropriate (See also 1.6, this Section).
 - a) Do not include submittal information for items listed with prior "A" or "B" in resubmittal.
 - 2) Indicate items to be resubmitted "at a later date" for any prior "C" or "D" Action item not included in resubmittal.
 - a) Obtain Principal Architect/Engineer's approval to exclude items.

6. Electronic submittals utilizing web based document management system (SharePoint®):

- a. Shop drawing submittals shall be produced (scanned) in Adobe Acrobat's Portable Document Format (PDF) Version 5.0 or higher.
- b. Do not password protect and/or lock the PDF document.
- c. Create one (1) PDF document (PDF file) for each submittal.
- d. Drawings or other graphics must be converted to PDF format and made part of the single (one [1]) PDF document.
 - 1) Scanning to be used only where actual file conversion is not possible.
- e. Limit PDF document size to 5MB.

- f. Rotate pages that must be viewed in landscape to the appropriate position for easy reading.
- g. Images only shall be scanned at a resolution of 300 dpi or greater.
 - 1) Perform Optical Character Recognition (OCR) capture on all images.
 - 2) Achieve OCR with the "original image with hidden text" option.
 - 3) Word searches of the PDF document must operate successfully to demonstrate OCR compliance.
- h. Create bookmarks in the navigation frame, for each entry in the Table of Contents/Index.
 - 1) Normally three (3) levels deep (i.e., "Chapter," "Section," "Sub-section").
- i. Thumbnails must be generated for each PDF file.
- j. Set the opening view for PDF files as follows:
 - 1) Initial view: Bookmarks and Page.
 - 2) Magnification: Fit in Window.
 - 3) Page layout: Single page.
 - 4) Set the file to open to the cover page of the submittal with bookmarks to the left, and the first bookmark linked to the cover page.
- k. All PDF documents shall be set with the option "Fast Web View" to open the first pages of the document for the viewer while the rest of the document continues to load.
- l. File naming conventions:
 - 1) File names shall use a "nine dot three" convention (XXXXXX-YY-Z.PDF) where XXXXXX is the Specification Section number, YY is the

Shop Drawing Root series number and Z is an ID number used to designate the associated volume.

a) Example 1:

(1) Two (2) pumps submitted as separate Shop Drawings under the same Specification Section:

(a) Pump 1 = 43 21 21-01-1.pdf.

(b) Pump 2 = 43 21 21-02-1.pdf.

b) Example 2:

(1) Control system submitted as one (1) Shop Drawing but separated into two (2) shop drawing submittals:

(a) Volume 1 = 40 90 00-01-1.pdf.

(b) Volume 2 = 40 90 00-01-2.pdf.

7. Provide clear space (3 In Sq) for Principal Architect/Engineer stamping of each component defined in the PREPARATION OF SUBMITTALS Article – Contractor Stamping.
8. Contractor shall not use red color for marks on transmittals.
 - a. Duplicate all marks on all copies transmitted, and ensure marks are photocopy reproducible.
 - b. Outline Contractor marks on reproducible transparencies with a rectangular box.
9. Transmittal contents:
 - a. Coordinate and identify Shop Drawing contents so that all items can be easily verified by the Owner's Representative and the Principal Architect/Engineer.
 - b. Identify equipment or material use, tag number, Drawing detail reference, weight, and other Project specific information.
 - c. Provide sufficient information together with technical cuts and technical data to allow an evaluation to be made to determine that the item submitted is in compliance with the Contract Documents.
 - d. Submit items such as equipment brochures, cuts of fixtures, product data sheets or catalog sheets on 8-1/2 x 11 In pages.
 - 1) Clearly mark (indicate) exact item or model and all options proposed.
 - e. When a Shop Drawing submittal is called for in any Specification Section, include as appropriate, scaled details, sizes, dimensions, performance characteristics, capacities, test data, anchoring details, installation instructions, storage and handling instructions, color charts, layout Drawings, rough-in diagrams, wiring diagrams, controls, weights and

other pertinent data in addition to information specifically stipulated in the Specification Section.

1) Arrange data and performance information in format similar to that provided in Contract Documents.

2) Provide, at minimum, the detail specified in the Contract Documents.

f. Provide warranty information.

g. If proposed equipment or materials deviate from the Contract Drawings or Specifications in any way, clearly note the deviation and justify the said deviation in detail in a separate letter immediately following transmittal sheet.

10. Samples:

a. Identification:

1) Identify sample as to transmittal number, manufacturer, item, use, type, project designation, tag number, standard Specification Section

or Drawing detail reference, color, range, texture, finish and other pertinent data.

- 2) If identifying information cannot be marked directly on sample without defacing or adversely altering samples, provide a durable tag with identifying information securely attached to the sample.

- b. Include application specific brochures, and installation instructions.
- c. Provide Contractor's stamp of approval on samples or transmittal form as indication of Contractor's checking and verification of dimensions and coordination with interrelated work.
- d. Resubmit samples of rejected items.

C. Miscellaneous Submittals:

1. Prepare in the format and detail specified in Specification requiring the miscellaneous submittal.

D. Operation and Maintenance Manuals:

1. Owner's use of manufacturer's Operation and Maintenance materials:
 - a. Materials are provided for Owner's use, reproduction and distribution as training and reference materials within Owner's organization.
 - 1) Applicable to hard copy or electronic media.
 - 2) Applicable to materials containing copyright notice as well as those with no copyright notice.
 - b. Notify manufacturer of this intended use of materials provided under the Contract.
2. Number each Operation and Maintenance Manual transmittal with the original root number of the associated Shop Drawing.
 - a. Identify resubmittals with the original number plus a suffix letter starting with "A."
3. Submittal format:
 - a. Interim submittals: Submit two (2) paper copies until manual is approved.
 - b. Final submittals:
 - 1) Within 30 days of receipt of approval, submit one (1) additional paper copy and two (2) electronic copies to the Owner's Document

Management System (SharePoint) in Portable Document Format (PDF).

- a) Compact discs to be secured in jewel cases.
- 2) Electronic copies will be reviewed for conformance with the approved paper copy and the electronic copy (PDF) requirements of this Specification.
- 3) Non-conforming CDs will be returned with comments.
 - a) Provide final CDs within 30 days of receipt of comments.
- 4. Paper copy submittals:
 - a. Submit Operation and Maintenance Manuals printed on 8-1/2 x 11 In size heavy first quality paper with standard three-hole punching and bound in

appropriately sized three-ring (or post) vinyl view binders with clear overlays front, spine and back.

- 1) Provide binders with titles inserted under clear overlay on front and on spine of each binder.
 - a) As space allows, binder titles shall include, but not necessarily be limited to, Project Name, related Specification Number, Equipment Name(s) and Project Equipment Tag Numbers.
- 2) Provide a Cover Page for each manual with the following information:
 - a) Manufacturer(s).
 - b) Date.
 - c) Project Owner and Project Name.
 - d) Specification Section.
 - e) Project Equipment Tag Numbers.
 - f) Model Numbers.
 - g) Principal Architect/Engineer.
 - h) Contractor.
- 3) Provide a Table of Contents or Index for each manual.
- 4) Use plastic-coated dividers to tab each section of each manual per the manual's Table of Contents/Index for easy reference.
- 5) Provide plastic sheet lifters prior to first page and following last page.
- b. Reduce Drawings or diagrams bound in manuals to an 8-1/2 x 11 In or 11 x 17 In size.
 - 1) Where reduction is not practical to ensure readability, fold larger Drawings separately and place in vinyl envelopes which are bound into the binder.
 - 2) Identify vinyl envelopes with Drawing numbers.
- c. Mark each sheet to clearly identify specific products and component parts and data applicable to the installation for the Project.
 - 1) Delete or cross out information that does not specifically apply to the Project.
5. Electronic copy submittals:
 - a. Electronic copies of the approved paper copy Operation and Maintenance Manuals are to be produced in Adobe Acrobat's Portable Document Format (PDF) Version 5.0 or higher.
 - b. Do not password protect and/or lock the PDF document.

- c. Create one (1) PDF document (PDF file) for each equipment O&M Manual.
- d. Drawings or other graphics must be converted to PDF format and made part of the one (1) PDF document.
 - 1) Scanning to be used only where actual file conversion is not possible.
- e. Rotate pages that must be viewed in landscape to the appropriate position for easy reading.
- f. Images only shall be scanned at a resolution of 300 dpi or greater.
 - 1) Perform Optical Character Recognition (OCR) capture on all images.
 - 2) Achieve OCR with the "original image with hidden text" option.
 - 3) Word searches of the PDF document must operate successfully to demonstrate OCR compliance.
- g. Create bookmarks in the navigation frame, for each entry in the Table of Contents/Index.
 - 1) Normally three (3) levels deep (i.e., "Chapter," "Section," "Sub-section").
- h. Thumbnails must be generated for each PDF file.
- i. Set the opening view for PDF files as follows:
 - 1) Initial view: Bookmarks and Page.
 - 2) Magnification: Fit in Window.
 - 3) Page layout: Single page.
 - 4) Set the file to open to the cover page of the manual with bookmarks to the left, and the first bookmark linked to the cover page.
- j. All PDF documents shall be set with the option "Fast Web View" to open the first pages of the document for the viewer while the rest of the document continues to load.
- k. File naming conventions:
 - 1) File names shall use a "ten dot three" convention (XXXXXX-YY-Z.PDF) where XXXXXX is the Specification Section number, YY is the

Shop Drawing Root number and Z is an ID number used to designate the associated volume.

a) Example 1:

(1) Two (2) pumps submitted as separate Shop Drawings under the same Specification Section:

(a) Pump 1 = 43 21 21-01-1.pdf.

(b) Pump 2 = 43 21 21-02-1.pdf.

b) Example 2:

(1) Control system submitted as one (1) Shop Drawing but separated into two (2) O&M volumes:

(a) Volume 1 = 40 90 00-01-1.pdf.

(b) Volume 2 = 40 90 00-01-2.pdf.

I. Labeling:

1) As a minimum, include the following labeling on all CD-ROM discs and jewel cases:

a) Project Name.

b) Equipment Name and Project Tag Number.

c) Project Specification Section.

d) Manufacturer Name.

e) Vendor Name.

m. Binding:

1) Include labeled CD(s) in labeled jewel case(s).

a) Bind jewel cases in standard three-ring binder Jewel Case Page(s), inserted at the front of the Final paper copy submittal.

b) Jewel Case Page(s) to have means for securing Jewel Case(s) to prevent loss (e.g., flap and strap).

6. Operation and Maintenance Manuals for Materials and Finishes:

a. Building Products, Applied Materials and Finishes:

1) Include product data, with catalog number, size, composition and color and texture designations.

2) Provide information for re-ordering custom manufactured products.

b. Instructions for Care and Maintenance:

1) Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods and recommended schedule for cleaning and maintenance.

- c. Moisture Protection and Weather Exposed Products:
 - 1) Include product data listing, applicable reference standards, chemical composition, and details of installation.
 - 2) Provide recommendations for inspections, maintenance and repair.
- d. Additional requirements as specified in individual product specifications.
- 7. Operation and Maintenance Manuals for Equipment and Systems:
 - a. Submission of Operation and Maintenance Manuals for equipment and systems is applicable but not necessarily limited to:
 - 1) Major equipment.
 - 2) Equipment powered by electrical, pneumatic or hydraulic systems.
 - 3) Specialized equipment and systems including instrumentation and control systems and system components for HVAC process system control.
 - 4) Valves and water control gates.
 - b. Equipment and Systems Operation and Maintenance Manuals shall include, but not necessarily be limited to, the following completed forms and detailed information, as applicable:
 - 1) Fully completed type-written copies of the associated Equipment Record(s), Exhibits A1, A2 and A3, shall be included under the first

tab following the Table of Contents of each Operation and Maintenance Manual.

- a) Each section of the Equipment Record must be completed in detail.
 - (1) Simply referencing the related manual for nameplate, maintenance, spare parts or lubricant information is not acceptable.
 - b) For equipment items involving components or subunits, a fully completed Equipment Record Form is required for each operating component or subunit.
 - c) Submittals that do not include the associated Equipment Record(s) will be rejected without further content review.
 - d) Electronic copies of the Exhibits may be obtained by contacting the Project Manager.
- 2) Equipment function, normal operating characteristics, limiting operations.
 - 3) Assembly, disassembly, installation, alignment, adjustment, and checking instructions.
 - 4) Operating instructions for start-up, normal operation, control, shutdown, and emergency conditions.
 - 5) Lubrication and maintenance instructions.
 - 6) Troubleshooting guide.
 - 7) Parts lists:
 - a) Comprehensive parts and parts price lists.
 - b) A list of recommended spare parts.
 - c) List of spare parts provided as specified in the associated Specification Section.
 - 8) Outline, cross-section, and assembly Drawings; engineering data; and electrical diagrams, including elementary diagrams, wiring diagrams,

connection diagrams, word description of wiring diagrams and interconnection diagrams.

9) Test data and performance curves.

10) As-constructed fabrication or layout Drawings and wiring diagrams.

11) Instrumentation or tag numbers assigned to the equipment by the Contract Documents are to be used to identify equipment and system components.

12) Additional information as specified in the associated equipment or system Specification Section.

1.7 TRANSMITTAL OF SUBMITTALS

A. Shop Drawings, Samples and Operation and Maintenance Manuals:

1. Transmit all submittals via Owner's Document Management System (SharePoint).
2. Transmit all paper submittals to the address provided below.

San Jacinto River Authority
2436 Sawdust Road
The Woodlands, Texas 77380
Attn: (Construction Manager – TBD)

3. Utilize SJRA Standard Submittal Transmittal Form (to be provided by Owner) to transmit all Shop Drawings, Samples and Operation and Maintenance Manuals.
4. All submittals must be from Contractor.
 - a. Submittals will not be received from or returned to subcontractors.
 - b. Operation and Maintenance Manual submittal stamp may be Contractor's standard approval stamp.
5. Provide submittal information defining specific equipment or materials utilized on the Project.
 - a. Generalized product information, not clearly defining specific equipment or materials to be provided, will be rejected.

B. Miscellaneous Submittals:

1. Transmit under Contractor's standard Submittal Transmittal Form or letterhead.
2. Submit in triplicate or as specified in individual Specification Section.
3. Transmit to the address provided below.

San Jacinto River Authority
2436 Sawdust Road
The Woodlands, Texas
Attn: (Construction Manager – TBD)

4. Provide copy of Submittal Transmittal without attachments to Owner's Representative.

C. Expedited Return Delivery:

1. Include prepaid express envelope or airbill in submittal transmittal package for any submittals Contractor expects or requires express return mail.
2. Inclusion of prepaid express envelope or airbill does not obligate Owner's Representative or Principal Architect/Engineer to conduct expedited review of submittal.

D. Fax Transmittals:

1. Permitted on a case-by-case basis to expedite review when approved by Principal Architect/Engineer.
2. Requires hard copy transmittal to immediately follow.
 - a. Principal Architect/Engineer will proceed with review of fax transmittal.
 - b. Principal Architect/Engineer's approval or rejection comments will be recorded and returned on hard copy transmittal.
3. Provisions apply to both:
 - a. Initial transmittal contents.
 - b. Supplemental information required to make initial transmittal contents complete.

1.8 PRINCIPAL ARCHITECT/ENGINEER'S REVIEW ACTION

A. Shop Drawings and Samples:

1. Items within transmittals will be reviewed for overall design intent and will receive one of the following actions:
 - a. NO EXCEPTION.
 - b. EXCEPTIONS AS NOTED.
 - c. REVISE & RESUBMIT
 - d. REJECTED - RESUBMIT.
 - e. ACKNOWLEDGE RECEIPT.
 - f. FOR INFORMATION PURPOSES ONLY.

- g. SUPPLEMENTARY INFORMATION.
- 2. Submittals received will be initially reviewed to ascertain inclusion of Contractor's approval stamp.
 - a. Submittals not stamped by the Contractor or stamped with a stamp containing language other than that specified herein will not be reviewed for technical content and will be returned without any action.
- 3. In relying on the representation on the Contractor's review and approval stamp, Owner and Principal Architect/Engineer reserve the right to review and process poorly organized and poorly described submittals as follows:
 - a. Submittals transmitted with a description identifying a single item and found to contain multiple independent items:
 - 1) Review and approval will be limited to the single item described on the transmittal letter.
 - 2) Other items identified in the submittal will:
 - a) Not be logged as received by the Principal Architect/Engineer.
 - b) Be removed from the submittal package and returned without review and comment to the Contractor for coordination, description and stamping.
 - c) Be submitted by the Contractor as a new series number, not as a re-submittal number.
 - b. Principal Architect/Engineer, at Principal Architect/Engineer's discretion, may revise the transmittal letter item list and descriptions, and conduct review.
 - 1) Unless Contractor notifies Principal Architect/Engineer in writing that the Principal Architect/Engineer's revision of the Submittal Transmittal Form item list and descriptions was in error, Contractor's review and

approval stamp will be deemed to have applied to the entire contents of the submittal package.

4. Submittals returned with Action "A" or "B" are considered ready for fabrication and installation.
 - a. If for any reason a submittal that has an "A" or "B" Action is resubmitted, it must be accompanied by a letter defining the changes that have been made and the reason for the resubmittal.
 - b. Destroy or conspicuously mark "SUPERSEDED" all documents having previously received "A" or "B" Action that are superseded by a resubmittal.
5. Submittals with Action "A" or "B" combined with Action "C" (Revise and Resubmit) or "D" (Rejected) will be individually analyzed giving consideration as follows:
 - a. The portion of the submittal given "C" or "D" will not be distributed (unless previously agreed to otherwise at the Preconstruction Conference).
 - 1) One (1) copy or the one (1) transparency of the "C" or "D" Drawings will be marked up and returned to the Contractor.
 - a) Correct and resubmit items so marked.
 - b. Items marked "A" or "B" will be fully distributed.
 - c. If a portion of the items or system proposed are acceptable, however, the major part of the individual Drawings or documents are incomplete or require revision, the entire submittal may be given "C" or "D" Action.
 - 1) This is at the sole discretion of the Principal Architect/Engineer.
 - 2) In this case, some Drawings may contain relatively few or no comments or the statement, "Resubmit to maintain a complete package."
 - 3) Distribution to the Owner and field will not be made (unless previously agreed to otherwise).
6. Failure to include any specific information specified under the submittal paragraphs of the Specifications will result in the submittal being returned to the Contractor with "C" or "D" Action.
7. Calculations: Requirements for the submittal of calculations in the individual Specification Sections shall be satisfied through the submittal of a certification sealed by the Principal Architect/Engineer that the calculations have been performed. Certification will be received for information purposes only and will be returned stamped "D. ACKNOWLEDGE RECEIPT".
8. Transmittals of submittals which the Principal Architect/Engineer considers as "Not Required" submittal information, which is supplemental to but not essential to prior submitted information, or items of information in a transmittal which have been reviewed and received "A" or "B" Action in a

prior submittal, will be returned with Action "E. Acknowledge Receipt" (Principal Architect/Engineer 's Review Not Required).

9. Samples may be retained for comparison purposes.
 - a. Remove samples when directed.
 - b. Include in bid all costs of furnishing and removing samples.
10. Approved samples submitted or constructed, constitute criteria for judging completed work.
 - a. Finished work or items not equal to samples will be rejected.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

EXHIBIT A1 Equipment Record

Equipment Data and Spare Parts Summary

Project Name						Specification Section:	
Equipment Name						Year Installed:	
Project Equipment Tag No(s).							
Equipment Manufacturer						Project/Order No.	
Address						Phone	
Fax		Web Site		E-mail			
Local Vendor/Service Center							
Address						Phone	
Fax		Web Site		E-mail			
MECHANICAL NAMEPLATE DATA							
Equip.				Serial No.			
Make				Model No.			
ID No.	Frame No.	HP	RPM	Cap.			
Size	TDH	Imp. Sz.	CFM	PSI			
Other:							
ELECTRICAL NAMEPLATE DATA							
Equip.				Serial No.			
Make				Model No.			
ID No.	Frame No.	HP	V.	Amp.	HZ	PH	RPM
Duty	Code	Ins. Cl.	Type	NEMA	C Amb.	Temp. Rise	SF
Other:							
SPARE PARTS PROVIDED PER CONTRACT							
Part No.	Part Name						Quantity

RECOMMENDED SPARE PARTS		
Part No.	Part Name	Quantity

Recommended Maintenance Summary

Standard Specification
Contract No. 19-0055

EXHIBIT A3 Equipment Record

Lubrication Summary

Equipment Description	Project Equip. Tag No(s).
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Lubricant Point						
Lubricant Type	Manufacturer		Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

Lubricant Point						
Lubricant Type	Manufacturer		Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

Lubricant Point						
Lubricant Type	Manufacturer		Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

Lubricant Point						
Lubricant Type	Manufacturer		Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

Lubricant Point						
Lubricant Type	Manufacturer		Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

Lubricant Point						
Lubricant Type	Manufacturer		Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

END OF SECTION

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SECTION 01 35 05

ENVIRONMENTAL PROTECTION AND SPECIAL CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Addresses:

1. Minimizing the pollution of air, water, or land; control of noise, the disposal of solid waste materials, and protection of deposits of historical or archaeological interest.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

- A. Unit Prices. No separate payment will be made for this item. Include the cost of same in associated items for this project.

1.3 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
2. Prior to the start of any construction activities submit:
 - a. A detailed proposal of all methods of control and preventive measures to be utilized for environmental protection.
 - b. A drawing of the work area, haul routes, storage areas, access routes and current land conditions including trees and vegetation.
 - c. Submit manufacturer's catalog sheets and other product data on dispensing equipment, pump, and aboveground fuel storage tanks, indicating capacity and dimensions of tank.
 - d. Submit drawings to show location of tank protection area and driveway. Indicate nearest inlet or channelized flow area. Clearly dimension distances and measurements.
 - e. Submit list of spill containment equipment, and quantities thereof, located at fueling area.

1.4 ENVIRONMENTAL CONTROLS

- A. Provide and maintain methods, equipment, and temporary construction as necessary for controls over environmental conditions at construction site and adjacent areas.
- B. Work to minimize impact to surrounding environment. Adopt construction procedures that do not cause unnecessary excavation and filling of terrain, indiscriminate destruction of vegetation, air or stream pollution, nor harassment or destruction of wildlife.
- C. Recognize and adhere to environmental requirements of Project. Limit disturbed areas to boundaries established by Contract. Avoid pollution of "on-site" streams, sewers, wells, or other water sources.
- D. Burning of rubbish, debris, or waste materials is not permitted.

1.5 POLLUTION CONTROL

- A. Provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere by discharge of noxious substances from construction operations.
- B. Provide equipment and personnel to perform required emergency measures to contain spillage, and to remove contaminated soils or liquids. Excavate and dispose of contaminated earth off-site, and replace with suitable compacted fill and topsoil.
- C. Provide systems for control of atmospheric pollutants.
 - 1. Prevent toxic concentrations of chemicals.
 - 2. Prevent harmful dispersal of pollutants into atmosphere.
- D. Use equipment that conforms to current Federal, State, and local laws and regulations.
- E. Install or otherwise implement positive controls to prevent hazardous materials migrating from Work area.

1.6 PEST AND RODENT CONTROL

- A. Provide rodent and pest control as necessary to prevent infestation of construction or storage areas.
- B. Employ methods and use materials which will not adversely affect conditions at site or on adjoining properties.

1.7 NOISE CONTROL

- M. Provide vehicles, equipment, and construction activities that minimize noise to greatest degree practicable. Conform noise levels to latest OSHA standards.

Do not permit noise levels to interfere with Work or create nuisance in surrounding areas.

- N. Conduct construction operations during daylight hours except as approved by Owner's Representative.
- O. Select construction equipment to operate with minimum noise and vibration. When in opinion of Owner's Representative, objectionable noise or vibration is produced by equipment, rectify conditions without additional cost to Owner. Sound Power Level (PWL) of equipment shall not exceed 85 dbA (re: 10-12

watts) measured 5 feet from piece of equipment. Explicit equipment noise requirements are specified with equipment specifications.

1.8 DUST CONTROL

- A. Control objectionable dust caused by operation of vehicles and equipment. Apply water or use other methods, subject to approval of Owner's Representative, to control amount of dust generated.

1.9 WATER RUNOFF AND EROSION CONTROL

- A. Comply with Texas Pollutant Discharge Elimination System (TPDES) permit when required.
- B. In addition to TPDES requirements:
 - 1. Provide methods to control surface water, runoff, subsurface water, and water from excavations and structures to prevent damage to Work, site, or adjoining properties.
 - 2. Control fill, grading and ditching to direct water away from excavations, pits, tunnels, and other construction areas; and to direct drainage to proper runoff courses so as to prevent erosion, sedimentation or damage.
 - 3. Provide, operate, and maintain equipment and facilities of adequate size to control surface water.
 - 4. Dispose of drainage water in manner to prevent flooding, erosion, or other damage to portion of site or to adjoining areas and in conformance with environmental requirements.
 - 5. Retain existing drainage patterns external to construction site by constructing temporary earth berms, sedimentation basins, retaining areas, and temporary ground cover as needed to control conditions.
 - 6. Plan and execute construction and earth work by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.
 - a. Minimize area of bare soil exposed at one time.
 - b. Provide temporary control measures, as berms, dikes, and drains.
 - 7. Construct fills and waste areas by selective placement to eliminate erosion of surface silts or clays.
 - 8. Inspect earthwork periodically to detect evidence of start of erosion. Apply corrective measures as required to control erosion.

1.10 QUALITY ASSURANCE

- A. Person conducting visual examination for pollutant shall be fully knowledgeable about the TPDES Construction General Permit, detecting sources of storm water contaminants, inspection of aboveground storage tank and appurtenances for

leakage, and the day-to-day operations that may cause unexpected pollutant releases.

PART 2 - PRODUCTS

2.1 ABOVEGROUND FUEL STORAGE TANK

- A. Tank Assembly: Must be listed with UL 1709 and UL 2085.
- B. Inner Steel Storage Tank: Follow UL 142, with minimum thickness of 1/8-inch welded construction.
- C. Tank Encasement: Either concrete or steel to provide minimum of 110 percent containment of inner tank capacity. Provide 5-gallon overspill containment pan for tank refueling.
- D. Dispenser Pump: For submersible pump, UL listed emergency shut-off valve to be installed at each dispenser. For suction pump, UL listed vacuum-activated shut-off valve, with shear section, is to be installed at each dispenser. Fuel may not be dispensed from tank by gravity flow or by pressurization of tank. Means must be provided to prevent release of fuel by siphon flow.
- E. Representative Manufacturers: Convault, Fireguard, Ecovault, SuperVault, or equal.

2.2 CONCRETE

- A. Provide concrete with minimum strength of 4,000 psi at 28 days.

2.3 AGGREGATES

- A. Coarse aggregate shall consist of crushed stone, gravel, crushed blast furnace slag, or combination of these materials. Aggregate shall be composed of clean,

hard, durable materials, free from adherent coatings, salt, alkali, dirt, clay, loam, shale, soft or flaky materials, or organic and injurious matter.

B. Coarse aggregates shall conform to following gradation requirements.

Sieve Size	Percent Retained
<u>(Square Mesh)</u>	<u>(By Weight)</u>
2-1/2"	0
2"	0 - 20
1-1/2"	15 - 50
3/4"	60 - 80
No. 4	95 - 100

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Employ and utilize environmental protection methods, obtain all necessary permits, and fully observe all local, state, and federal regulations.
- B. No clearing and grubbing or rough cutting permitted until erosion and sediment control systems are in place, other than site Work specifically directed by Owner's Representative to allow soil testing and surveying.
- C. Prohibit equipment and vehicles from maneuvering on areas outside of dedicated rights-of-way and easements for construction. Immediately repair damage caused by construction traffic to erosion and sediment control systems.
- D. Maintain existing erosion and sediment control systems located within project site until acceptance of Project or until directed by Owner's Representative to remove and discard existing system.
- E. Regularly inspect and repair or replace damaged components of erosion and sediment control systems as specified in this Section. Unless otherwise directed, maintain erosion and sediment control systems until project area stabilization is accepted by the Owner. Remove erosion and sediment control systems promptly when directed by Owner's Representative. Discard removed materials off site.
- F. Remove and dispose sediment deposits at designated spoil site for Project. If a project spoil site is not designated on Drawings, dispose of sediment off site at

location not in or adjacent to stream or flood plain. Assume responsibility for off-site disposal. Spread sediment evenly throughout site, compacted and stabilized. Prevent sediment from flushing into a stream or drainage way. If sediment has been contaminated, dispose of in accordance with existing federal, state, and local rules and regulations.

- G. Assume responsibility for collecting, storing, hauling, and disposing of spoil, silt, and waste materials as specified in this or other Specifications and in compliance with applicable federal, state, and local rules and regulations.
- H. Employ protective measures to avoid damage to existing trees to be retained on project site. Conduct construction operations under this Contract in conformance with erosion control practices described in Drawings and this or other Specifications.
- I. Prepare spill response and containment procedures to be implemented in event of significant materials spill. Significant materials include but are not limited to: raw materials; fuels; materials such as solvent, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under Section 101(14) of CERCLA; chemical required to be reported pursuant to Section 313 of Title III of SARA; fertilizers; pesticides, and waste products such as slag, ashes and sludge that have potential to be released with storm water discharges. Spill containment procedures shall be kept on-site or in construction field office.
- J. Spill containment equipment appropriate to size of operation is to be located in close proximity of fueling area. Such equipment includes, but not limited to,

suitable waste containers for significant materials, drip pans, booms, inlet covers, or absorbent.

- K. Properly label significant materials or waste containers used for construction activities and stored on-site overnight.
- L. Install, maintain, and inspect erosion, sediment control measures and practices as specified in Drawings and in this or other Specifications
- M. Land Protection:
 - 1. Except for any work or storage area and access routes specifically assigned for the use of the Contractor, the land areas outside the limits of construction shall be preserved in their present condition.
 - a. Contractor shall confine his construction activities to areas defined for work within the Contract Documents.
 - 2. Manage and control all borrow areas, work or storage areas, access routes and embankments to prevent sediment from entering nearby water or land adjacent to the work site.
 - 3. Restore all disturbed areas including borrow and haul areas and establish permanent type of locally adaptable vegetative cover.
 - 4. Unless earthwork is immediately paved or surfaced, protect all side slopes and backslopes immediately upon completion of final grading.
 - 5. Plan and execute earthwork in a manner to minimize duration of exposure of unprotected soils.
 - 6. Except for areas designated by the Contract Documents to be cleared and grubbed, the Contractor shall not deface, injure or destroy trees and

vegetation, nor remove, cut, or disturb them without approval of the Owner's Representative.

- a. Any damage caused by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at the Contractor's expense.
7. Utilize, as necessary, erosion control methods to protect side and backslopes, minimize and the discharge of sediment to the surface water leaving the construction site as soon as rough grading is complete.
- a. These controls shall be maintained until the site is ready for final grading and landscaping or until they are no longer warranted and concurrence is received from the Owner's Representative.
 - b. Physically retard the rate and volume of run-on and runoff by:
 - 1) Implementing structural practices such as diversion swales, terraces, straw bales, silt fences, berms, storm drain inlet protection, rocked outlet protection, sediment traps and temporary basins.
 - 2) Implementing vegetative practices such as temporary seeding, permanent seeding, mulching, sod stabilization, vegetative buffers,

hydroseeding, anchored erosion control blankets, sodding, vegetated swales or a combination of these methods.

- 3) Providing Construction sites with graveled or rocked access entrance and exit drives and parking areas to reduce the tracking of sediment onto public or private roads.
8. Discharges from the construction site shall not contain pollutants at concentrations that produce objectionable films, colors, turbidity, deposits or noxious odors in the receiving stream or waterway.

N. Solid Waste Disposal:

1. Collect solid waste on a daily basis.
2. Provide disposal of degradable solid waste to an approved solid waste disposal site.
3. Provide disposal of nondegradable solid waste to an approved solid waste disposal site or in an alternate manner approved by Owner's Representative and regulatory agencies.
4. No building materials wastes or unused building materials shall be buried, dumped, or disposed of on the site.

O. Fuel and Chemical Handling:

1. Store and dispose of chemical wastes in a manner approved by regulatory agencies.
2. Take special measures to prevent chemicals, fuels, oils, greases, herbicides, and insecticides from entering drainage ways.
3. Do not allow water used in onsite material processing, concrete curing, cleanup, and other waste waters to enter a drainage way(s) or stream.
4. The Contractor shall provide containment around fueling and chemical storage areas to ensure that spills in these areas do not reach waters of the state.

P. Control of Dust:

1. The control of dust shall mean that no construction activity shall take place without applying all such reasonable measures as may be required to

prevent particulate matter from becoming airborne so that it remains visible beyond the limits of construction.

- a. Reasonable measures may include paving, frequent road cleaning, planting vegetative groundcover, application of water or application of chemical dust suppressants.
 - b. The use of chemical agents such as calcium chloride must be approved by the State of Texas DOT.
2. Utilize methods and practices of construction to eliminate dust in full observance of agency regulations.
 3. The Owner's Representative will determine the effectiveness of the dust control program and may request the Contractor to provide additional measures, at no additional cost to Owner.

Q. Burning:

1. Do not burn material on the site.
2. If the Contractor elects to dispose of waste materials by burning, make arrangements for an off-site burning area and conform to all agency regulations.

R. Control of Noise:

1. Control noise by fitting equipment with appropriate mufflers.

S. Completion of Work:

1. Upon completion of work, leave area in a clean, natural looking condition.
2. Ensure all signs of temporary construction and activities incidental to construction of required permanent work are removed.

T. Historical Protection:

1. If during the course of construction, evidence of deposits of historical or archaeological interests is found, cease work affecting find and notify Owner's Representative.
 - a. Do not disturb deposits until written notice from Owner's Representative is given to proceed.
2. The Contractor will be compensated for lost time or changes in construction to avoid the find based upon normal change order procedures.

3.2 TOPSOIL PLACEMENT FOR EROSION AND SEDIMENT CONTROL SYSTEMS

- A. When topsoil is specified as a component of another Specification, conduct erosion control practices described in this Specification during topsoil placement operations.

- B. When placing topsoil, maintain erosion and sediment control systems consisting of swales, grade stabilization structures, berms, dikes, waterways, and sediment basins.
- C. Maintain grades which have been previously established on areas to receive topsoil.
- D. After areas to receive topsoil have been brought to grade, and immediately prior to dumping and spreading topsoil, loosen subgrade by discing or by scarifying to a depth of at least 2 inches to permit bonding of topsoil to subsoil. Compact by passing bulldozer up and down slope, tracking over entire surface area of slope to create horizontal erosion control slots.
- E. No sod or seed shall be placed on soil which has been treated with soil sterilants until sufficient time has elapsed to permit dissipation of toxic materials.

3.3 DUST CONTROL

- A. Implement dust control methods to control dust creation and movement on construction sites and roads and to prevent airborne sediment from reaching receiving streams or storm water conveyance systems, to reduce on-site and off-site damage, to prevent health hazards, and to improve traffic safety.
- B. Control blowing dust by using one or more of following methods:
 - 1. Mulches bound with chemical binders such as Carasol, Terratack, or equal.
 - 2. Temporary vegetative cover.
 - 3. Spray-on adhesives on mineral soils when not used by traffic.
 - 4. Tillage to roughen surface and bring clods to surface.
 - 5. Irrigation by water sprinkling.
 - 6. Barriers using solid board fences, snow fences, burlap fences, crate walls, bales of hay, or similar materials.
- C. Implement dust control methods immediately whenever dust can be observed blowing on project site.

3.4 KEEPING STREETS CLEAN

- A. Keep streets clean of construction debris and mud carried by construction vehicles and equipment. If necessary, install stabilized construction exits at construction, staging, storage, and disposal areas. Vehicle/equipment wash area (stabilized with coarse aggregate) may be installed adjacent to stabilized construction exit, as needed. Release wash water into a drainage swale or inlet

protected by erosion and sediment control measures. Construction exit specified in Section 01 57 13.02 - Stabilized Construction Access.

- B. In addition to stabilized construction exits, shovel or sweep pavement to extent necessary to keep street clean. Water hosing or sweeping of debris and mud off of street into adjacent areas is not allowed.

3.5 EQUIPMENT MAINTENANCE AND REPAIR

- A. Confine maintenance and repair of construction machinery and equipment to areas specifically designated for that purpose. Locate areas so that oils, gasoline, grease, solvents, and other potential pollutants cannot be washed directly into receiving streams or storm water conveyance systems. Provide these areas with adequate waste disposal receptacles for liquid as well as solid waste. Clean and inspect maintenance areas daily.
- B. On construction site where designated equipment maintenance areas are not feasible, take precautions during each individual repair or maintenance operation to prevent potential pollutants from washing into streams or conveyance systems. Provide temporary waste disposal receptacles.

3.6 WASTE COLLECTION AND DISPOSAL

- A. Formulate and implement a plan for collection and disposal of waste materials on construction site. In plan, designate locations for trash and waste receptacles and establish a collection schedule. Specify and carry out methods for ultimate disposal of waste in accordance with applicable local, state, and federal health and safety regulations. Make special provisions for collection and disposal of liquid wastes and toxic or hazardous materials.
- B. Keep receptacles and waste collection areas neat and orderly to extent possible. Waste shall not be allowed to overflow its container or accumulate from day-to-day. Locate trash collection points where they shall least likely be affected by concentrated storm water runoff.

3.7 WASHING AREAS

- A. Avoid washing concrete delivery trucks or dump trucks and other construction equipment at locations where runoff shall flow directly into a watercourse or storm water conveyance system. Designate special areas for washing vehicles. Locate these areas where wash water shall spread out and evaporate or infiltrate directly into ground, or where runoff can be collected in temporary holding or seepage basin. Beneath wash areas construct a gravel or rock base to minimize mud production.

3.8 STORAGE OF CONSTRUCTION MATERIALS AND CHEMICALS

- A. Isolate sites where chemicals, cements, solvents, paints, or other potential water pollutants are stored in areas where they shall not cause runoff pollution.
- B. Store toxic chemicals, materials, pesticides, paints, and acids in accordance with manufacturers' guidelines. Protect groundwater resources from leaching

by placing a plastic mat, packed clay, tar paper, or other impervious materials on areas where toxic liquids are to be opened and stored.

3.9 DEMOLITION AREAS

- A. Demolition activities which create large amounts of dust with significant concentrations of heavy metals or other toxic pollutants shall use dust control techniques to limit transport of airborne pollutants. However, retain water or slurry used to control dust contaminated with heavy metals or toxic pollutants on site, and prevent runoff directly into watercourses or storm water conveyance systems. Carry out methods of ultimate disposal of these materials in accordance with applicable local, state, and federal health and safety regulations.

3.10 SANITARY FACILITIES

- A. Provide construction sites with adequate portable toilets for workers in accordance with applicable health regulations.

3.11 PESTICIDES

- A. Use and store pesticides during construction in accordance with manufacturers' guidelines and with local, state, and federal regulations. Avoid overuse of pesticides which could produce contaminated runoff. Take great care to prevent accidental spillage. Never wash pesticide containers in or near flowing streams or storm water conveyance systems.

3.12 CONSTRUCTION METHODS

- A. Provide fuel tank protection area and driveway as shown on Drawings.
- B. Do not locate fueling area in or near channelized flow area or close to storm sewer conveyance system. Provide sufficient space to allow installation of other erosion and sediment controls to protect those areas.
- C. Clear and grub fueling area to remove unsuitable materials. Place geotextile fabric as permeable separator to prevent mixing of coarse aggregate with underlying soil. Overlap fabric minimum of 6 inches. Place coarse aggregate on top of geotextile fabric to minimum depth of 8 inches.
- D. Grade protection area and driveway to provide sufficient drainage away from stabilized areas. Use sandbags, gravel, boards, or similar methods to prevent sediment from entering public right-of-way, receiving stream or storm water conveyance system. Provide driveway to fuel tank area with minimum width of 15 feet for one-way traffic and 30 feet for two-way traffic.
- E. Place aboveground storage tank on top of cast-in-place or pre-cast foundation. Base size and thickness of foundation on size and weight of tank to be used, with minimum thickness of 6 inches. Enclose concrete foundation by 5-inch by

5-inch concrete curb and extend minimum of 1 foot beyond tank and dispenser assemblies, so that leak and drip can be contained within concrete foundation.

- F. Slope concrete foundation minimum of 1 percent toward 6-inch wide by 12-inch long by 4-inch deep sump pit. Install minimum of 2-inch pipe inside sump pit with valve on outside of curb to allow draining of concrete foundation.
- G. Install portable concrete Jersey Barrier around concrete foundation. Provide minimum clearance of 2 feet from edge of foundation. In lieu of Jersey barrier, install 4-inch diameter steel pipe bollards around foundation. Bury bollards minimum of 3 feet deep, 3 feet above ground, and 4 feet on center, encased in 12-inch wide concrete foundation.

3.13 MAINTENANCE

- A. Inspections shall be conducted by designated health and safety officer qualified to conduct health and safety inspections.
- B. Inspect stabilized areas after every storm event and at least once a week. Provide periodic top dressing with additional coarse aggregate to maintain required depth. Repair and clean out damaged control measures used to trap sediment.
- C. Inspect fuel tank foundation's bermed area after every storm event and at least once a week. Visually examine storm water contained in tank's bermed foundation area for oil sheen or other obvious indicators of storm water pollution. Properly dispose of storm water when pollutant is present. Record visual examination of storm water discharge in Report noting date and time of examination, name of examiner, observations of water quality, and volume of storm water discharged from bermed area. Keep Report with other storm water pollution control inspection reports on site, in readily accessible location.

3.14 TEMPORARY FUELING AREA CLOSURE

- A. Dispose of temporary vehicle and equipment fueling area by removal of sediment and erosion controls properly off site. Owner's Representative will inspect top soils in fueling area and immediate vicinity for evidence of fuel leaks. If Owner's Representative determines that sufficient pollutants have been released, remove soil and properly dispose off site. Other remediation methods may be required.

END OF SECTION

SECTION 01 45 16.32
CONTRACTOR'S QUALITY CONTROL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Measurement and Payment
 - 2. Quality Assurance/Control of Installation
 - 3. References
 - 4. Manufacturer's Field Services and Reports
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

- A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS (NOT USED)

1.4 QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality at no additional cost to the Owner.
- B. Comply fully with manufacturers' installation instructions, including each step in sequence.
- C. Request clarification Owner's Representative before proceeding when manufacturers' instructions conflict with Contract.
- D. Comply with specified standards as minimum requirements for Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce specified level of workmanship.

1.5 REFERENCES

- A. Obtain copies of standards and maintain at job site when required by individual Specification sections.

1.6 MANUFACTURERS' FIELD SERVICES AND REPORTS

- A. When specified in individual Specification sections or as required by Owner's Representative, provide material or product suppliers' or manufacturers' technical representative to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, operator training, test, adjust and balance of equipment as applicable and to initiate operation, as required. Conform to minimum time requirements for start-up operations and operator training when defined in Specification sections.
- B. At Owner's Representative's request, submit qualifications of manufacturers' representative to Owner's Representative 15 days in advance of required representatives' services. Representative is subject to approval by Owner's Representative.
- C. A manufacturers' representative is to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to a manufacturer's written instructions. Submit report within 14 days of observation to Owner's Representative for review.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 45 29
TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Testing laboratory services
2. Requirements of this section apply to testing laboratories employed by the Contractor for approval of manufactured products, materials, including mix designs and quality control of materials
3. Requirements of this section also apply to testing laboratories employed by the Owner for approval of materials and the constructed Work on site.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Proposal Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project

1.3 QUALITY ASSURANCE

A. Reference Standards

1. ASTM C 1077 – Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
2. ASTM D 3666 – Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Bituminous Paving Materials.
3. ASTM D 3740 – Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
4. ASTM E 329 – Standard Specification for Minimum Requirements for Agencies Engaged the Testing and/or Inspection of Materials Used in Construction.
5. ISO/IEC 17025 – General Requirements for the Competence of Calibration and Testing Laboratories.

1.4 RELATED REQUIREMENTS

A. To test products and materials and provide certifications as identified in Part 2

Products, in the individual Specification sections, the Contractor shall either

1. Select, employ and pay for services of an independent testing laboratory or laboratories, or
 2. Cause its suppliers to perform required inspection and testing using an independent testing laboratory or a qualified in-house laboratory.
- B. Owner's Representative may, at its option, observe or witness any and all testing of materials and products which are to be utilized in the construction of the Work as they are being tested by the Contractor's laboratories.
- C. Owner will select, employ, and pay for services of an independent testing laboratory to perform inspection and testing identified in Part 3 of individual Specification sections.
- D. Employ and pay for services of independent testing laboratory or laboratories to perform inspection and testing identified in Part 2 of individual Specification sections.
- E. Employment of testing laboratory by Owner does not relieve the Contractor of obligation to perform the Work in accordance with requirements of Contract Documents.
- F. Owner's Representative schedules and monitors Owner's testing laboratory. Provide minimum 24 hours notice of testing to Owner's Representative to avoid delay of the Work.

1.5 QUALIFICATION OF LABORATORY

- A. Meet laboratory qualification requirements of ASTM E 329 and applicable requirements of ASTM C 1077, ASTM D 3666, and ASTM D 3740.
- B. Meet ISO/IEC 17025 conditions for accreditation by the American Association for Laboratory Accreditation (A2LA) in specific fields of testing required in individual Specification sections.
- C. If laboratory subcontracts are part of testing services, such work will be placed with laboratory complying with requirements of this Section.

1.6 LABORATORY

- A. Owner's testing laboratory will provide and distribute copies of laboratory reports to the distribution list provided by Owner's Representative at the preconstruction conference. Distribution will include download to the Owner's electronic document management system (SharePoint) for the Project.
- B. Keep one copy of each laboratory report at site field office for duration of project.
- C. Contractor's testing laboratory will provide and distribute copies of laboratory test reports for materials to be incorporated into this Work to the distribution list provided by Owner's Representative at the preconstruction conference.

Distribution will include download to the Owners electronic document management system (Sharepoint) for the Project

- D. Laboratories will email material supplier, Contractor, and Owner's Representative no later than close of business on working day following test completion and review, reports which indicate failing test results.

1.7 LIMITS ON TESTING LABORATORY AUTHORITY

- A. Laboratory may not release, revoke, alter, or enlarge requirements of Contract.
- B. Laboratory may not approve or accept any portion of the Work.
- C. Laboratory may not assume duties of Contractor or the Owner
- D. Laboratory has no authority to stop the Work.

1.8 SUBMITTALS (NOT USED)

1.9 CONTRACTOR RESPONSIBILITIES

- A. Provide safe access to the Work and to manufacturer's facilities for Owner's Representative, and for testing laboratory personnel.
- B. Provide testing laboratory with copy of construction schedule and copy of each update to construction schedule.
- C. Notify Owner's Representative and testing laboratory during normal working hours of the day previous to expected time for operations requiring inspection and testing services. When Contractor fails to make timely prior notification, then do not proceed with operations requiring inspection and testing services.
- D. Notify Owner's Representative 24 hours in advance when Specification requires presence of Owner's Representative for sampling or testing.
- E. Request and monitor testing as required to provide timely results and avoid delay to the Work. Where specified, provide samples to laboratory in sufficient time to allow required test to be performed in accordance with specified test methods before intended use of material.
- F. Cooperate with laboratory personnel in collecting samples on site. Provide incidental labor and facilities for safe access to the Work to be tested; to obtain and handle samples at site or at source of products to be tested; and to facilitate tests and inspections including storage and curing of test samples.
- G. Arrange with laboratory through Owner's Representative. Payment for additional testing will be made in accordance with Specification Section 00 72 00 - General Conditions of the Contract:
 - 1. Retesting required for failed tests
 - 2. Retesting for nonconforming Work
 - 3. Additional sampling and tests requested beyond specified requirements
 - 4. Insufficient notification of cancellation of tests for Work scheduled but not

performed.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONDUCTING TESTING

- A. Conform laboratory sampling and testing specified in individual Specification sections to latest issues of ASTM standards, TxDOT methods, or other recognized test standards as approved by Owner's Representative.
- B. Requirements of this section also apply to those tests for approval of materials, for mix designs and for quality control of materials as performed by employed testing laboratories.

END OF SECTION

SECTION 01 55 26
TRAFFIC CONTROL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes traffic control requirements for signs, signals, control devices, flares, lights, as well as construction parking control, English-speaking flagpersons, peace officers, designated haul routes and bridging of trenches and excavations.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for Traffic Control and Regulation. Include in related work items.
 - 1. Flagmen. No separate payment.

1.3 SUBMITTALS

- A. Conform to requirements of Section 01 33 00 – Submittals.
- B. Traffic control plan responsive to the current Texas Manual on Uniform Traffic Control Devices (TMUTCD) sealed by Registered Professional Engineer is incorporated into Drawings. If Contractor proposes to implement traffic control without modification to plan provided, submit a letter confirming decision. If Contractor proposes to implement traffic control different than plan provided, submit a traffic control plan in conformance with TMUTCD sealed by Registered Professional Engineer.
- C. Submit copies of approved lane closure permits.
- D. Provide information and records regarding use of qualified flagmen to verify use of “peace officers” as flagmen in compliance with Contract and Texas law, including but not limited to, Article 4413 (29bb), commonly referred to as Private Investigators and Private Security Agencies Act, and Article 2.12, Texas Code of Criminal Procedure.
- E. Provide information and records regarding use of qualified flagmen to verify Contractor’s use of “certified flagmen” as flagmen is in compliance with Contract.

1.4 FLAGMEN

- A. Use flagmen, qualified as described under Paragraph 1.4.B, Uniformed Peace Officers, and Paragraph 1.4.C, Certified Flagmen, to control, regulate, and

direct even flow and movement of vehicular and pedestrian traffic when construction operations encroach on public traffic lanes.

- B. Uniformed Peace Officer: Individual who has full-time employment as peace officer and receives compensation as flagman for private employment as individual employee or independent contractor. Private employment may be either employee-employer relationship or on an individual basis. Flagman may not be in employ of another peace officer and may not be a reserve peace officer.
1. Peace officer is defined as:
 - a. Sheriffs and their deputies
 - b. Constables and deputy constables
 - c. Marshals or police officers of an incorporated city, town, or village
 - d. As otherwise provided by Article 2.12, Texas Code of Criminal Procedure, as amended
 2. Individual who has full-time employment as a peace officer is one who is actively employed in a full-time capacity as a peace officer working, on average, a minimum of 32 paid hours per week, being paid a rate of pay not less than prevailing minimum hourly wage rate set by federal Wage and Hour Act and entitled to full benefits of participation in retirement plan, vacation, holidays, and insurance benefits. A reserve peace officer does not qualify, under this definition, as a peace officer.
- C. Certified Flagman: Individual who receives compensation as flagman and meets the following qualifications and requirements:
1. Formally trained and certified in traffic control procedures.
 2. Required to wear distinctive uniform, bright-colored vest, and be equipped with appropriate flagging and communication devices
 3. English speaking, with Spanish as advantageous, but not required, primary, or secondary language.
 4. Paid as Certified Flagman, equivalent to hourly wage rate set for Rough Carpenter under Specification Section 00 73 43 – Wage Scale for Construction.
 5. Required to carry proof of training/certification and photographic identification card issued by training institute to allow Owner's Representative to easily determine necessary full-time traffic control is

actually provided when and where construction work encroaches upon traffic lanes.

PART 2 - PRODUCTS

2.1 SIGNS, SIGNALS, AND DEVICES

- A. Comply with Texas State Manual on Uniform Traffic Control Devices.
- B. Traffic Barriers, Cones and Drums, Flares and Lights: As approved by local jurisdictions.

PART 3 - EXECUTION

3.1 PUBLIC ROADS

- A. Abide by laws and regulations of governing authorities when using public roads. If Work requires public roads be temporarily impeded or closed, obtain approvals from governing authorities and pay permits before starting any Work. Coordinate activities with Owner's Representative.
- B. Maintain 10-foot-wide, all-weather lane adjacent to Work areas for use of emergency vehicles. Keep all-weather lane free of construction equipment and debris.
- C. Cover or remove the permanent signs and construction signs that are incorrect or that do not apply to the current situation for a particular phase. Do not mount signs on drums or barricades, except those listed in the latest Barricades and Construction standard sheets.
- D. Place positive barriers to protect drop-off conditions greater than 1 FT within the clear zones that remain overnight.
- E. Construction activities not to obstruct normal flow of traffic from 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. on designated major arterials or as directed by the Owner.
- F. Maintain local driveway access to residential and commercial properties adjacent to Work areas at all times. Use all-weather materials as approved by

Owner's Representative when maintaining temporary driveway access to commercial and residential driveways.

- G. Cleanliness of Surrounding Streets: Keep streets used for entering and leaving job area free of excavated material, debris, and foreign material resulting from construction operations.
- H. Provide Owner's Representative 1-week notice prior to implementing each approved traffic control phase.
- I. Notify local schools, churches, bus lines, police department, commercial businesses, and fire department in writing of construction a minimum of 5 working days prior to beginning Work.
- J. Remove existing signing and striping that are in conflict with construction activities or may cause driver confusion.
- K. Provide safe access for pedestrians along major cross streets.
- L. Alternate closures of cross streets so that two adjacent cross streets are not closed simultaneously.
- M. Do not close more than two consecutive esplanade openings at a time without prior approval by Owner's Representative.

3.2 CONSTRUCTION PARKING CONTROL

- A. Control vehicular parking to prevent interference with public traffic and parking, and access by emergency vehicles.
- B. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.
- C. Prevent parking on or adjacent to access roads or in non-designated areas.

3.3 FLARES AND LIGHTS

- A. Provide flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

3.4 HAUL ROUTES

- A. Utilize haul routes designated by authorities or shown on Drawings for construction traffic.
- B. Confine construction traffic to designated haul routes.
- C. Provide traffic control at critical areas of haul routes to regulate traffic and minimize interference with public traffic.

3.5 TRAFFIC SIGNS AND SIGNALS

- A. Construct necessary traffic control devices for temporary signals including but not limited to loop detectors, traffic signal conduits, traffic signal wiring, and crosswalk signals required to complete Work. Notify, a minimum of 60 days in advance, the agency concerning control boxes and switchgear. The agency will

perform service, programming, or adjustments, to signal boxes and switchgear should this work be required during construction.

- B. Install and operate traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control and areas affected by Contractor's

operations. Establish notices, signs, and traffic controls before moving into next phase of traffic control.

- C. Relocate traffic signs and signals as Work progresses to maintain effective traffic control.
- D. Unless otherwise approved by Owner's Representative, provide driveway signs with name of business that can be accessed from particular cross-over. Use two signs for each cross-over.
- E. Replace existing traffic control devices in project area.
- F. Owner's Representative may direct Contractor to make minor traffic control sign adjustments to eliminate driver confusion and maintain traffic safety during construction at no additional payment.

3.6 BRIDGING TRENCHES AND EXCAVATIONS

- A. Whenever necessary, bridge trenches and excavation to permit an unobstructed flow of traffic. Provide steel plates that can be laid across construction areas and major drives of commercial businesses.
- B. Secure bridging against displacement by using adjustable cleats, angles, bolts, or other devices whenever bridge is installed:
 - 1. On existing bus route.
 - 2. When more than 5 percent of daily traffic is comprised of commercial or truck traffic.
 - 3. When more than two separate plates are used for bridge.
 - 4. When bridge is to be used for more than 5 consecutive days.
- C. Install bridging to operate with minimum noise.
- D. Adequately shore trench or excavation to support bridge and traffic.
- E. Extend steel plates used for bridging a minimum of 1 foot beyond edges of trench or excavation. Use temporary paving materials (premix) to feather edges of plates to minimize wheel impact on secured bridging.
- F. Use steel plates of sufficient thickness to support H-20 loading, truck or lane, that produces maximum stress.

3.7 REMOVAL

- A. Remove equipment and devices when no longer required.
- B. Repair damage caused by installation.
- C. Remove post settings to a depth of 2 feet.

3.8 TRAFFIC CONTROL, REGULATION, AND DIRECTION

- A. Use flagmen to control, regulate, and direct even flow and movement of vehicular and pedestrian traffic including but not limited to the following conditions:
 - 1. Where multi-lane vehicular traffic must be diverted into single lane vehicular traffic
 - 2. Where vehicular traffic must change lanes abruptly
 - 3. Where construction equipment must enter or cross vehicular traffic lanes and walks
 - 4. Where construction equipment may intermittently encroach on vehicular traffic lanes and unprotected walks and crosswalks
 - 5. Where traffic regulation is needed due to rerouting of vehicular traffic around Work site.
 - 6. Other areas of Work where construction activities might affect public safety and convenience.
- B. Use and maintain flagmen at points for periods of time as may be required to provide for public safety and convenience of travel.
- C. Use of flagmen is for purpose of assisting in regulation of traffic flow and movement and does not relieve Contractor of full responsibility for taking other steps and providing other flaggers or personnel as Contractor may deem necessary to protect Work and public.

3.9 INSTALLATION STANDARDS

- A. Work in other phases shall be permitted, provided 1) phases are not continuous to one work is being done in presently, 2) installation of utility occurs in only one phase. Keep work and operation in second phase to an absolute minimum. Perform work in no more than two phases at a time. Authorization to perform work in second phase shall not relieve any responsibility of completing backfilling and paving operations in accordance with Contract.
- B. Place temporary pavement with a single lane closure, in accordance with TMUTCD.
- C. Reinstall temporary and permanent pavement markings as directed by Owner's Representative. Alternative markings shall be considered when marking manufacturer's weather conditions cannot be met. These alternatives are to be submitted and approved by Owner's Representative prior to installation. No extra payment will be made for use of alternative markings.

3.10 MAINTENANCE OF EQUIPMENT AND MATERIAL

- A. Designate individual to be responsible for maintenance of traffic handling around construction area. Individual must be accessible at all times to immediately correct any deficiencies in equipment and materials used to handle traffic including missing, damaged, or obscured signs, drums, barricades, or

pavement markings. Give name, address, and telephone number of designated individual to Owner's Representative.

- B. Make daily inspections of signs, barricades, drums, lamps, and temporary pavement markings to verify that these are visible, in good working order, and conform with traffic handling plans and directions of Owner's Representative. When not in compliance, immediately bring equipment and materials into compliance by replacement, repair, cleaning, relocation, and realignment.
- C. Keep equipment and materials, especially signs and pavement markings, clean and free of dust, dirt, grime, oil, mud, or debris.
- D. Owner's Representative shall decide if damaged or vandalized signs, drums, and barricades can be reused.

END OF SECTION

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SECTION 01 65 50

PRODUCT DELIVERY, STORAGE, AND HANDLING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for product delivery, storage and handling.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 - Proposing Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 - General Requirements.

1.2 MEASUREMENT AND PAYMENT

- A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this payment.

1.3 SUBMITTALS

- A. Provide Owner project Log Book.

1.4 TRANSPORTATION

- A. Make arrangements for transportation, delivery, and handling of equipment and materials required for timely completion of Work.
- B. Transport and handle products in accordance with instructions.
- C. Consign and address shipping documents to proper party giving name of Project, street number, and city. Shipments shall be delivered to Contractor.

1.5 DELIVERY

- A. Scheduling: Schedule delivery of products or equipment as required to allow timely inspection and installation, and to avoid prolonged storage, overburdening of limited storage space, conflicts with other contractors on site. Confirm availability of equipment and personnel for handling products prior to delivery.
- B. Packaging: Deliver products or equipment in manufacturer's original unopened and unbroken cartons or other containers designed and constructed to protect the contents from physical or environmental damage.
- C. Identification: Clearly and fully mark and identify as to manufacturer, item, and installation location.
- D. Protection and Handling: Provide manufacturer's instructions for storage and handling.

PART 2 - PRODUCTS

- A. Products: Means material, equipment, or systems forming Work. Does not include machinery and equipment used for preparation, fabrication, conveying, and erection of Work. Products may also include existing materials or components designated for reuse.
- B. For material and equipment specifically indicated or specified to be reused in the work:
 - 1. Use special care in removal, handling, storage and reinstallation, to assure proper function in completed work.
 - 2. Arrange for transportation, storage and handling of products which require offsite storage, restoration or renovation. Pay all costs for such work.
- C. When contract documents require that installation of work comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in installation, including two copies to Owner's Representative. Maintain one set of complete instructions at job site during installation until completion.
- D. Provide equipment and components from fewest number of manufacturers as practical, in order to simplify spare parts inventory and allow for maximum interchangeability of components. For multiple components of same size, type, or application, use same make and model of component throughout Project.

PART 3 - EXECUTION

3.1 PROTECTION, STORAGE AND HANDLING

- A. Protection:
 - 1. Protect materials in accordance with manufacturer's recommendations and requirements of these Specifications.
 - a. Store products or equipment in location to avoid loss or physical damage to items while in storage.
 - 2. Protect equipment from exposure to elements and keep thoroughly dry.
- B. Storage:
 - 1. Store materials in accordance with manufacturer's recommendations and requirements of these Specifications.
 - 2. Make necessary provisions for safe storage of materials and equipment. Place loose soil materials, and materials to be incorporated into Work to prevent damage to any part of Work or existing facilities and to maintain free access at all times to all parts of Work and to utility service company installations in vicinity of Work. Keep materials and equipment neatly and compactly stored in locations that will cause minimum inconvenience to other contractors, public travel, adjoining owners, tenants, and occupants. Arrange storage to provide easy access for inspection.

3. Restrict storage to areas available on construction site for storage of material and equipment as shown on Drawings or approved by Owner's Representative.
4. Provide off-site storage and protection when on-site storage is not adequate. Provide addresses of and access to off-site storage locations for inspection by Owner's Representative.
5. Do not use lawns, grass plots, or other private property for storage purposes without written permission of owner or other person in possession or control of premises.
6. Store in manufacturers' unopened containers.
7. Neatly, safely, and compactly stack materials delivered and stored along line of Work to avoid inconvenience and damage to property owners and general public, and maintain at least 3 feet from fire hydrant. Keep public, private driveways, and street crossings open.
8. Repair or replace damaged lawns, sidewalks, streets, or other improvements to satisfaction of Owner's Representative. Total length which materials may be distributed along route of construction at one time is 1,000 linear feet, unless otherwise approved in writing by Owner's Representative.

C. Handling:

1. Handle materials in accordance with manufacturer's recommendations and requirements of these Specifications.
2. Coordinate off-loading of materials and equipment delivered to job site. If necessary to move stored materials and equipment during construction, relocate materials and equipment at no additional cost to Owner. Do not allow the off-loading of materials in those parking areas used for crew's personal vehicles.
3. Provide equipment and personnel necessary to handle products by methods to prevent damage to products or packaging.
4. Provide additional protection during handling as necessary to prevent breaking, scraping, marring, or otherwise damaging products or surrounding areas.
5. Handle products by methods to prevent over bending or over stressing.
6. Lift heavy components only at designated lifting points.
7. Do not drop, roll, or skid products off delivery vehicles. Hand carry or use suitable materials handling equipment.

3.2 STORAGE FACILITIES

A. Temporary Storage Building (if required):

1. Provide a weatherproof temporary storage building specifically for the purpose of providing for protection of products and equipment.

- a. Size building to accommodate anticipated storage items.
2. Equip building with lockable doors and lighting, and provide electrical service for equipment space heaters and heating or ventilation as necessary to provide storage environments acceptable to specified manufacturers.
3. Provide methods of storage of products and equipment off the ground.
4. Provide this structure within 10 days after Notice to Proceed.
 - a. Locate building on-site where shown on the Drawings or in location approved by the Owner's Representative.
 - b. Remove building from site prior to startup and demonstration period.

3.3 FIELD QUALITY CONTROL

A. Inspect Deliveries:

1. Inspect all products or equipment delivered to the site prior to unloading.
 - a. Reject all products or equipment that are damaged, used, or in any other way unsatisfactory for use on Project.

B. Monitor Storage Area: Monitor storage area to ensure suitable temperature and moisture conditions are maintained as required by manufacturer or as appropriate for particular items.

END OF SECTION

SECTION 01 71 13

MOBILIZATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for mobilization.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 – Proposing Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

- A. Measurement for mobilization is on lump sum basis.
- B. Mobilization payments will be included in periodic progress payment upon written application subject to following provisions:
 - 1. Authorization for payment of 50 percent of Contract Price for mobilization will be made upon receipt and approval by Owner's Representative of the following items, as applicable:
 - a. Schedule of Values submittal in accordance with Specification Section 01 29 73 – Schedule of Values.
 - b. Safety Program/Plan submittal in accordance with the Trench Safety Program/Plan in accordance with Specification Section 31 41 00 – Trench Safety System.
 - c. Construction Schedule submittal in accordance with Specification Section 01 32 16 – Construction Progress Schedule.
 - d. Preconstruction photographs in accordance with Specification Section 01 32 36.01 – Project Photographs.
 - 2. Authorization for payment of remaining 50 percent of Contract Price for mobilization will be made upon completion of Work amounting to 5 percent of Contract Price less mobilization unit price.
- C. Mobilization payments will be subject to retainage amounts stipulated in Specification Section 00 72 00 – General Conditions of the Contract.
- D. A reduction of 10 percent of mobilization amount bid in Schedule for Unit Price Work will be applied to each Payment Application when Field Office is not properly maintained. Proper maintenance consists of operational plumbing and

sanitary facilities, adequate potable water supply, operational telephone and facsimile machine and functional temperature control.

1.3 SUBMITTALS (NOT USED)

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 71 32.16
CONSTRUCTION SURVEYING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for construction surveying.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 – Proposing Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 – General Requirements.

1.2 QUALITY CONTROL

- A. Conform to State of Texas laws for surveys requiring licensed surveyors.
- B. Employ land surveyor acceptable to the Owner, if required.

1.3 MEASUREMENT AND PAYMENT

- A. No Separate payment will be made for field surveying. Include cost in unit price for Work requiring field surveying.

1.4 SUBMITTALS

- A. Conform to requirements of Specification Section 01 33 00 – Submittals.
- B. Submit to Owner's Representative name, address, and telephone number of Surveyor before starting survey work.
- C. Submit documentation verifying accuracy of survey work on request.
- D. Submit certificate signed by surveyor, that elevations and locations of Work are in conformance with Contract.

1.5 PROJECT RECORD DOCUMENTS

- A. Maintain complete and accurate log of control and survey Work as it progresses.
- B. Prepare certified survey setting forth dimensions, locations, angles, and elevations of construction and site Work upon completion of foundation walls and major site improvements.
- C. Submit Record Documents under provisions of Specification Section 01 78 39 – Project Record Documents.

1.6 EXAMINATION

- A. Verify locations of survey control points prior to starting Work.
- B. Notify Owner's Representative immediately of any discrepancies discovered.

1.7 SURVEY REFERENCE POINTS

- A. Control datum for survey established by provided survey as indicated on Contract Drawings. Inform Owner's Representative in advance of time at which horizontal and vertical control points will be established so verification deemed necessary by Owner's Representative may be done with minimum inconvenience to Owner's Representative and minimum delay to Contractor.
- B. Locate and protect survey control points prior to starting site work; preserve permanent reference points during construction.
- C. Notify Owner's Representative 48 hours in advance of need for relocation of reference points due to changes in grades or other reasons.
- D. Report promptly to Owner's Representative loss or destruction of reference point.
- E. Contractor to replace permanent reference points disturbed by operations, at no additional cost to the Owner.

1.8 SURVEY REQUIREMENTS

- A. Utilize recognized engineering survey practices.
- B. Establish minimum of two permanent bench marks on site, referenced to established control points. Record locations with horizontal and vertical data on Project Record Documents.
- C. Establish elevations, lines, and levels to provide quantities required for measurement and payment and to provide appropriate controls for Work. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading; fill and topsoil placement; utility locations, slopes, and invert elevations
 - 2. Grid or axis for structures
 - 3. Building foundation, column locations, ground floor elevations
- D. Periodically verify layouts by same means.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 74 13

CLEANING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes intermediate and final cleaning of Work, not including special cleaning of closed systems specified elsewhere.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

- A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS (NOT USED)

1.4 STORAGE AND HANDLING

- A. Store cleaning products and cleaning wastes in containers specifically designed for those materials.

1.5 SCHEDULING

- A. Schedule cleaning operations so that dust and other contaminants disturbed by cleaning process will not fall on newly painted surfaces.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents:
 - 1. Compatible with surface being cleaned.
 - 2. New and uncontaminated.
 - 3. For Manufactured Surfaces: Material recommended by manufacturer.

PART 3 - EXECUTION

3.1 CLEANING - GENERAL

- A. Prevent accumulation of wastes that create hazardous conditions.
- B. Conduct cleaning and disposal operations to comply with laws and safety orders of governing authorities.

- C. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains or sewers.
- D. Dispose of degradable debris at an approved solid waste disposal site.
- E. Dispose of nondegradable debris at an approved solid waste disposal site or in an alternate manner approved by regulatory agencies.
- F. Handle materials in a controlled manner with as few handlings as possible.
- G. Do not drop or throw materials from heights greater than 4 FT or less than 4 FT if conditions warrant greater care.
- H. On completion of work, leave area in a clean, natural looking condition.
 - 1. Remove all signs of temporary construction and activities incidental to construction of required permanent Work.
- I. Do not burn on-site.

3.2 INTERIOR CLEANING

A. Cleaning During Construction:

- 1. Keep work areas clean so as not to hinder health, safety or convenience of personnel in existing facility operations.
- 2. At maximum weekly intervals, dispose of waste materials, debris, and rubbish.
- 3. Vacuum clean interior areas when ready to receive finish painting.
 - a. Continue vacuum cleaning on an as-needed basis, until Substantial Completion.

B. Final Cleaning:

- 1. Complete immediately prior to Demonstration Period.
- 2. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed surfaces.
- 3. Wipe all lighting fixture reflectors, lenses, lamps and trims clean.
- 4. Wash and shine glazing and mirrors.
- 5. Polish glossy surfaces to a clear shine.
- 6. Ventilating systems:
 - a. Clean permanent filters and replace disposable filters if units were operated during construction.

- b. Clean ducts, blowers and coils if units were operated without filters during construction.
- 7. Replace all burned out lamps.
- 8. Broom clean process area floors.
- 9. Mop office and control room floors.

3.3 EXTERIOR (SITE) CLEANING

A. Cleaning During Construction:

- 1. Construction debris:
 - a. Confine in strategically located container(s):
 - 1) Cover to prevent blowing by wind.
 - 2) Store debris away from construction or operational activities.
 - 3) Haul from site minimum once a week.
 - b. Remove from work area to container daily.
 - c. Site clean-up prior to storm events. Thoroughly clean site of all loose or unsecured items which may become airborne or transported by flowing water during storm events.
- 2. Vegetation: Keep weeds and other vegetation trimmed to 3 IN maximum height.
 - a. The use of chemical weed control substances should be avoided unless prior Owner approval is received.
- 3. Soils, sand, and gravel deposited on paved areas and walks:
 - a. Remove as required to prevent muddy or dusty conditions.
 - b. Do not flush into storm sewer system.

B. Final Cleaning:

- 1. Remove trash and debris containers from site.
 - a. Repair areas disturbed by location of trash and debris containers to Owner's satisfaction including but not limited to re-seeding, sod

placement, pavement repair, asphalt repair, sidewalk repair, and rut removal and/or fill placement.

2. Clean paved roadways.

3.4 FIELD QUALITY CONTROL

A. Immediately prior to Demonstration Period, conduct an inspection with Owner's Representative to verify condition of all work areas.

END OF SECTION

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SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for construction waste management and disposal.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 – Proposing Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for waste material disposal under this Section. Include payment in unit price for related sections.

1.3 SUBMITTALS

- A. Conform to requirements of Specification Section 01 33 00 – Submittals.
- B. Obtain and submit disposal permits for proposed disposal sites if required by local ordinances. Submit a copy of all disposal permits to the Owner's Representative.
- C. Submit copy of written permission from property owner(s) outside limits of Project, with description of property, prior to disposal of excess material. Submit written and signed release from property owner upon completion of

disposal work. Copies of the permission and release documents are to be submitted to the Owner's Representative.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 SALVAGEABLE MATERIAL

- A. Excavated Material: When indicated on Drawings, load, haul, and deposit excavated material at location or locations shown on Drawings outside limits of Project.
- B. Other Salvageable Materials: Conform to requirements of individual Specification Sections.
- C. Coordinate with the Owner's Representative the loading of salvageable material.

3.2 EXCESS MATERIAL

- A. Remove and legally dispose of vegetation, rubble, broken concrete, debris, asphaltic concrete pavement, excess soil, and other materials not designated for salvage from job site.
- B. Excess soil may be deposited on private property outside the Project limits when written permission is obtained from property owner. See Paragraph 1.3C above.
- C. Verify flood plain status of any proposed disposal site. Do not dispose of excavated materials in area designated as within 100-year Flood Hazard Area unless the proper permit has been obtained. Remove excess material placed in "100-year Flood Hazard Area" at no additional cost to the Owner.
- D. Remove waste materials from site daily, in order to maintain site in neat and orderly condition, unless otherwise authorized by the Owner.

END OF SECTION

SECTION 01 74 23
RESTORATION OF SITE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for the restoration of sites affected by Utility Work, Roadway Reconstruction or Widening, or Facilities Work. Section does not apply to roadway extension projects.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 – Proposing Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 – General Requirements.
 - 3. Section 02 41 13 13 – Removing Existing Pavements and Structures.
 - 4. Section 31 21 33 – Trenching, Backfilling, and Compacting for Utilities.
 - 5. Section 32 13 13 – Concrete Pavement, Curb, Sidewalks, and Steps.
 - 6. Section 32 90 00 – Seeding, Sodding, and Landscaping.
 - 7. Section 32 92 13 – Hydro-Mulching.

1.2 MEASUREMENT AND PAYMENT

- A. No separate payment will be made under this Section. Include costs with appropriate items.

1.3 REFERENCES

- A. ANSI Z60.1 – American Standard for Nursery Stock.

1.4 DEFINITIONS

- A. Site Restoration is replacement or reconstruction of site improvements to rights-of-way, easements, public property, and private property that are affected or altered by construction operations, with improvements to restore to a condition which is equal to, or better than, that which existed prior to construction operations.
- B. Site Improvement includes but is not limited to pavement, curb and gutter, esplanades, sidewalks, driveways, culverts, headwalls, mail boxes, lighting, signage, fences, lawns, irrigation systems, and landscaping.
- C. Line Segment. Length of water line or sewer from center line to center line of manholes, in line junction structure and bends as designated on Drawings, and to end of stubs or termination of pipe.
- D. Minimum Trench Width. Allowable trench width for corresponding pipe outside diameter as defined in Specification Section 31 21 33 – Trenching, Backfilling, and Compacting for Utilities, unless otherwise indicated on the Drawings.

1.5 SUBMITTALS

- A. Conform to requirements of Specification Section 01 33 00 – Submittals.
- B. Submit qualifications of nursery or landscaping firm to be used.

1.6 QUALITY ASSURANCE

- A. Have trees, landscape shrubs, and plantings performed by qualified personnel.

1.7 SCHEDULING

- A. After paving or utility work is completed on line segment and segment is submitted on monthly estimate for payment, complete site restoration for that segment in accordance with 3.1 of this Section, unless extended in writing by Owner's Representative.
- B. For utility work requiring testing or post-installation TV inspection, completion of segment is not considered to include testing or TV inspection. Schedule for completion of site restoration is not determined by completion of testing or TV inspection.

1.8 WARRANTY

- A. Provide 2-week warranty on plants and sod grasses that die due to shock or damage only.
- B. Replace plants that fail during warranty period according to specifications governing original plants.
- C. At the end of the warranty period, provide written notification to homeowner(s) stating the underlying property owner, advising that home owner is subsequently responsible for watering, maintaining replaced plants and grasses. Provide copy of notice to Owner's Representative. Notice to include date and time notice was provided, who provided the notice and how was delivered.
- D. Damage caused by natural hazards including hail, high winds or storm is not covered by warranty.
- E. Existing plant material required to be moved on site are covered under warranty.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Seeding and Sodding.

1. Provide sod and mechanically seed as specified in Specification Section 32 90 00 – Seeding, Sodding, and Landscaping. For areas to be seeded, conform to

PART 3 - EXECUTION

3.1 COORDINATION

- A. For water main and sanitary sewer and roadway reconstruction and widening, construction cannot exceed site restoration by more than 50% of total Project length or 1,000 lineal feet, whichever is less, unless otherwise approved by the Owner's Representative. Site restoration must proceed continuously and be sequentially completed in order of work progress. When utility work and reconstruction or widening work occurs within same limits of right-of-way, utility installation cannot exceed pavement improvements by more than 1,000 linear feet, unless otherwise approved by the Owner's Representative. No intermediate areas can be skipped or left to be completed at a future date, unless otherwise approved by the Owner.
- B. For water main and sanitary sewer construction, site restoration associated with wet connections, cut and plugs, salvaging of fire hydrants and sewer reconnections which needs to occur after line is tested, can be restored after 45 days provided site is restored immediately after accomplishing such work. Payment may be withheld for such wet connections, cut and plugs, salvaging of fire hydrants and sewer reconnection work until site restoration is complete.
- C. Limit utility installation to maximum of two project site locations for projects involving multiple subdivisions or locations, unless otherwise approved by the Owner's Representative.
- D. When roadway reconstruction and widening is being completed in phases, complete restoration of site in previous phase before continuing to next phase, unless otherwise approved by the Owner's Representative.

3.2 EXAMINATION

- A. Construction Site Photographs. Document conditions on and adjacent to construction site with construction photographs as specified in Specification Section 01 32 36.01 – Project Photographs.
- B. Make photographs of all areas where construction operations will be conducted including driveways and sidewalks within or adjacent to Work area.

3.3 PREPARATION (NOT USED)

3.4 INSTALLATION

- A. Pavement, Sidewalk, and Driveway Restoration.
 1. Replace pavement, curb and gutter, culverts, headwalls, sidewalks, and driveways removed or damaged as result of construction operations.

2. Where replacement sidewalks terminate at street curb radius, construct wheel chair ramp that meets current Texas Accessibility Standards.

B. Seeding and Sodding.

1. Clean up construction debris and level area with bank sand so that resulting surface of new grass matches level of existing grass and maintains pre-construction drainage patterns. Level minor ruts or depressions caused by construction operations where grass is still viable by filling with bank sand.
2. Restore previously existing turfed areas with sod and fertilize in accordance with Specification Section 32 90 00 – Seeding, Sodding, and Landscaping. Sod to match existing turf.

C. Trees, Shrubbery, and Plants.

1. Take extra care in removing and replanting trees, shrubbery, and plants. Remove trees, shrubbery, and plants, leaving soil around roots. Place trees, shrubbery, and plants outside of excavation area.
2. Replace in kind any trees, shrubbery, and plants removed or damaged by construction operations.
3. Have nursery or landscape firm make tree replacements using balled-and-burlapped nursery stock.

D. Fence Removal and Replacement.

1. Replace fencing removed or damaged to equal or better than what existed prior to construction, including concrete footings and mow strips. Provide new wood posts, top and bottom railing and panels. Metal fencing material not damaged by Work may be reused.
2. Remove and dispose of damaged or substandard material.

3.5 CLEANING

- A. Remove debris and trash to maintain clean and orderly site as described in General Conditions and Specification Section 01 74 19 – Construction Waste Management and Disposal.

3.6 MAINTENANCE

- A. Maintain shrubs, plantings, sodded areas and seeded areas through warranty period.
- B. Replace shrubs, plantings, and seeded or sodded areas that fail to become established through warranty period.
- C. Maintain newly planted trees, shrubs, and plantings as follows:
1. Water as often as necessary to keep ground and backfill moist until plantings have become established.
 2. Repair or replace bracing as necessary.
 3. Prune as necessary.

4. Treat plants in accordance with approved methods of horticultural practices where insects or disease affect plants after planting.

END OF SECTION

SECTION 01 75 00
FACILITY START-UP

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Procedures and actions, required of the Contractor, which are necessary to achieve and demonstrate Substantial Completion.
2. Requirements for Substantial Completion Submittals.
3. Owner personnel training.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

- A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS

1.4 DEFINITIONS

- A. Project Classified System (PCS): A defined part of the Project, consisting of an arrangement of items, such as equipment, structures, components, piping, wiring, materials, or incidentals, so related or connected to form an identifiable, unified, functional, operational, safe, and independent system.
- B. Pre-Demonstration Period:
1. The period of time, of unspecified duration after initial construction and installation activities during which Contractor, with assistance from manufacturer's representatives, performs in the following sequence:
 - a. Finishing type construction work to ensure the Project has reached a state of Substantial Completion.
 - b. Equipment start-up.
 - c. Personnel training.

- C. Demonstration Period: A period of time, of specified duration, following the Pre-Demonstration Period, during which the Contractor initiates the use of the equipment for the facility and starts up and operates the equipment, without exceeding specified downtime limitations, to prove the functional integrity of the mechanical and electrical equipment and components and the control interfaces of the respective equipment and components comprising the equipment as evidence of Substantial Completion.
- D. Substantial Completion: See Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.

1.5 SUBMITTALS

- A. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
 - 1. Substantial Completion Submittal:
 - a. File Contractor's Notice of Substantial Completion and Request for Inspection.
 - b. Approved Operation and Maintenance manuals received by Owner's Representative minimum 1 week prior to scheduled training.
 - c. Written request for Owner to witness each system pre-demonstration start-up. Request to be received by Owner minimum 1 week before scheduled training of Owner's personnel on that system.
 - d. Equipment installation and pre-demonstration start-up certifications.
 - e. Letter verifying completion of all pre-demonstration start-up activities including receipt of all specified items from manufacturers or suppliers as final item prior to initiation of Demonstration Period.

1.6 SEQUENCING AND SCHEDULING

- A. Phased Construction:
- B. Schedule of Events:

1.7 COST OF START-UP

- A. Contractor to pay all costs associated with Facility/Equipment start-up.

PART 2 - PRODUCTS

PART 3 - EXECUTION

3.1 GENERAL

- A. Facility Start-up Divided into One Period:
 - 1. Demonstration Period including:

- a. Completion of construction work to bring Project to a state of Substantial Completion.
- b. Start-up of Equipment.
- c. Training of Personnel.
- d. Completion of the filing of all required submittals.
- e. Filing of Contractor's Notice of Substantial Completion and Request for Inspection.
- f. Demonstration of functional integrity of facility or PCS.

3.2 DEMONSTRATION PERIOD

A. Completion of Construction Work:

- 1. Complete the work to bring the Project to a state of substantial completion.

B. Equipment Start-up:

- 1. Requirements for individual items of equipment are included in Divisions 02 through 48 of these Specification Sections.
- 2. Prepare the equipment so it will operate properly and safely and be ready to demonstrate functional integrity during the Demonstration Period.
- 3. Procedures include but are not necessarily limited to the following:
 - a. Test or check and correct deficiencies of:
 - 1) Power, control, and monitoring circuits for continuity prior to connection to power source.
 - 2) Voltage of all circuits.
 - 3) Phase sequence.
 - 4) Tagging and identification systems.
 - 5) All equipment: Proper connections, alignment, calibration and adjustment.
 - b. Calibrate all safety equipment.
 - c. Manually rotate or move moving parts to assure freedom of movement.
 - d. "Bump" start electric motors to verify proper rotation.
 - e. Perform other tests, checks, and activities required to make the equipment ready for Demonstration Period.
 - f. Documentation:
 - 1) Prepare a log showing each equipment item subject to this paragraph and listing what is to be accomplished during Equipment Start-up. Provide a place for the Contractor to record date and person

accomplishing required work. Submit completed document before requesting inspection for Substantial Completion certification.

4. Obtain certifications, without restrictions or qualifications, and deliver to Owner's Representative:
 - a. Manufacturer's equipment installation check letters.
 - b. Instrumentation Supplier's Instrumentation Installation Certificate.
- C. Personnel Training:
 1. See individual equipment specification sections.
 2. Conduct all personnel training after completion of Equipment Start-up for the equipment for which training is being conducted.
 - a. Personnel training on individual equipment or systems will not be considered completed unless:
 - 1) All pretraining deliverables are received and approved before commencement of training on the individual equipment or system.
 - 2) No system malfunctions occur during training.
 - 3) All provisions of field and classroom training specifications are met.
 - b. Training not in compliance with the above will be performed again in its entirety by the manufacturer at no additional cost to Owner.
 3. Field and classroom training requirements:
 - a. Hold training on-site.
 - b. Notify each manufacturer specified for on-site training that the Owner reserves the right to video record any or all training sessions.
 - c. Training instructor: Factory trained and familiar with giving both classroom and "hands-on" instructions.
 - d. Training instructors:
 - 1) Be at training on time. Session beginning and ending times to be coordinated with the Owner and indicated on the master schedule.
 - e. Organize training sessions into maintenance verses operation topics and identify on schedule.
 - f. Plan for minimum training attendance of 5 people at each session and provide sufficient materials, samples, and handouts for those in attendance.
- D. Demonstration:
 1. Demonstrate the functional integrity of the mechanical, electrical, and control interfaces of the respective equipment and components comprising the Equipment as evidence of Substantial Completion.

2. Duration of Demonstration Period: 8 consecutive hours (max or as directed by Owner).

Service interruptions will be discussed between the Contractor, Owner, and Owner's Representative. Whether or not service interruptions are included within the allowable inoperative period will be determined solely at the Owner's discretion.

Conduct the demonstration of functional integrity under full operational conditions.

3. Owner will provide operational personnel to provide process decisions affecting plant performance. Owner's assistance will be available only for process decisions. Contractor will perform all other functions including but not limited to equipment operation and maintenance until successful completion of the Demonstration Period.
4. Owner reserves the right to simulate operational variables, equipment failures, routine maintenance scenarios, etc., to verify the functional integrity of automatic and manual backup systems and alternate operating modes.
5. Time of beginning and ending any Demonstration Period shall be agreed upon by Contractor, Owner, and Owner's Representative in advance of initiating Demonstration Period.
6. Throughout the Demonstration Period, provide knowledgeable personnel to answer Owner's questions, provide final field instruction on select systems and to respond to any system problems or failures which may occur.
 - a. Provide final field instruction on the following systems:
7. Throughout the Demonstration Period, provide knowledgeable personnel to answer Owner's questions, provide final field instruction on select systems and to respond to any system problems or failures which may occur.
 - a. Provide Training in shifts to accommodate Owner's employees' schedules.
 - b. Provide all labor, supervision, utilities, chemicals, maintenance, equipment, vehicles or any other item necessary to operate and demonstrate all systems being demonstrated.

END OF SECTION

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SECTION 01 77 19
CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for closeout of a construction project.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 – Introductory Information, Proposing Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

- A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS (NOT USED)

1.4 SUBSTANTIAL COMPLETION

- A. Comply with Specification Section 00 72 00 – General Conditions of the Contract regarding Substantial Completion when Contractor considers the

Work, or portion thereof designated by Owner's Representative, to be substantially complete.

- B. Insure the following items have been completed when included in the Work, prior to presenting a list of items to be inspected by Owner's Representative for issuance of a Certificate of Substantial Completion:
 - 1. Cutting, plugging, and abandoning of water, wastewater, and storm sewer lines, as required by specifications for each item;
 - 2. Construction of, and repairs to, pavement, driveways, sidewalks, culverts, headwalls and curbs and gutters;
 - 3. Sodding and hydromulch seeding, unless waived by the Owner in writing;
 - 4. General clean up including signage, lighting, pavement markings, transfer of services, successful testing and landscape;
 - 5. Installation of all bid items included in Specification Section 00 41 00.02 – Proposal Form and approved Contract Document changes.
 - 6. Any additional requirements in Specification Section 01 11 20 – Use of Premises.
- C. Assist Owner's Representative with inspection of Contractor's list of items and complete or correct the items, including items added by Owner's Representative, within a time period of 30 days or as mutually agreed.
- D. Should Owner's Representative's inspection show failure of Contractor to comply with substantial completion requirements, including those items in

Paragraph 1.2B of this specification, Contractor shall complete or correct the items, before requesting another inspection by Owner's Representative.

1.5 CLOSEOUT PROCEDURES

- A. Comply with Specification Section 00 72 00 – General Conditions of the Contract regarding Final Inspection and Final Payment when Work is complete and ready for Owner's Representative's final inspection.
- B. Provide Project Record Documents in accordance with Specification Section 01 78 39 – Project Record Documents.
- C. Complete or correct items on punch list, with no new items added. Address new items during warranty period.
- D. Owner will occupy portions of Work as specified in other Sections.

1.6 FINAL CLEANING

- A. Execute final cleaning prior to Final Inspection.
- B. For facilities, clean interior and exterior glass and surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Clean equipment and fixtures to sanitary condition.
- D. Clean or replace filters of operating equipment.
- E. Clean debris from roofs, gutters, down spouts, and drainage systems.
- F. Clean site; sweep paved areas, rake landscaped surfaces clean.
- G. Remove waste and surplus materials, rubbish, and temporary construction facilities from site following final test of utilities and completion of Work.

1.7 ADJUSTING

- A. Adjust operating equipment to ensure smooth and unhindered operation in accordance with manufacturer's written instructions. Value of this testing and adjusting is five (5) percent of Lump Sum Amount in Schedule of Values for item being tested.

1.8 OPERATION AND MAINTENANCE DATA

- A. Submit operations and maintenance data as noted in Specification Section 01 33 00 – Submittals.
- B. Five (5) percent of Lump Sum Amount of each piece of equipment as indicated in Schedule of Unit Price Work or Schedule of Values shall be paid after

required O&M data submissions are received and approved by Owner's Representative.

1.9 WARRANTY

- A. Provide one original and two copies of each warranty from subcontractors, suppliers, and manufacturers.
- B. Provide Table of Contents and assemble warranties in three-ring/D binder with durable plastic cover.
- C. Submit warranties prior to final progress payment.
- D. Warranties shall commence in accordance with requirements in Specification Section 00 72 00 – General Conditions of the Contract.

1.10 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, maintenance, and extra materials in quantities specified in individual Specification sections.
- B. Deliver to location as directed by Owner's Representative; obtain receipt prior to final Payment Application.

1.11 TEXAS DEPARTMENT OF LICENSING AND REGULATION (TDLR) INSPECTION

- A. Contact TDLR's Houston Regional Office, 5425 Polk Street, Houston, Texas, 77023, telephone 713-924-6303, fax 713-921-3106, to schedule an inspection for ADA compliance prior to final completion.
- B. Provide results of TDLR's inspection to Owner's Representative prior to final inspection.

1.12 FINAL PHOTOS

- A. Provide per Specification Section 01 32 36.01 – Project Photographs.

1.13 PROJECT RECORD DOCUMENTS

- A. Provide per Specification Section 01 78 39 – Project Record Documents.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 78 23.13
OPERATIONS AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Measurement and Payment
2. Submittals
3. Equipment Operation and Maintenance Data

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

- A. Value of approved equipment operations and maintenance manuals is 5 percent of individual equipment value as indicated in Specification Section 00

41 00.02 – Proposal Form. This amount can be included in next progress payment after approval of submitted manual.

1.3 SUBMITTALS

- A. Conform to requirements of Section 01 33 00 – Submittals. Submit list of operation and maintenance manuals and parts manuals to be provided.
- B. Submit documents, bound in 8½- x 11-inch text pages, three-ring/D binders with durable plastic covers.
- C. Prepare binder covers with printed title “OPERATION AND MAINTENANCE INSTRUCTIONS,” title of project and subject matter of binder when multiple binders are required.
- D. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- E. Contents: Prepare Table of Contents for each volume, with each Product or system description identified.
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Owner, Owner’s Representative, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions, arranged by system. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify following:
 - a. Significant design criteria
 - b. List of equipment
 - c. Parts list for each component
 - d. Operating instructions
 - e. Maintenance instructions for equipment and systems
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents
 - 3. Part 3: Project documents and certificates, including following:
 - a. Shop drawings and product data
 - b. Air and water balance reports
 - c. Certificates
 - d. Photocopies of warranties
- F. Within 1 month prior to placing equipment or facility in service, submit one original and two copies of operation and maintenance manual and parts manual for review.

- G. Submit one original and two copies of completed volumes in final form 10 days prior to final inspection. This will be returned after final inspection, with Owner's comments. Revise content of documents as required prior to final submittal.
- H. Revise and resubmit final volumes within 10 days after final inspection.

1.4 EQUIPMENT OPERATION AND MAINTENANCE DATA

- A. Furnish operation and maintenance manuals for equipment. Operation and maintenance manual must contain all information required for the Owner to operate, maintain, and repair equipment. Manual must be prepared by equipment manufacturer, furnished to Owner's Representative and, as minimum, contain following:
 - 1. Equipment functions, normal operating characteristics and limiting conditions
 - 2. Assembly, installation, alignment, adjustment, and checking instructions
 - 3. Operating instructions for start-up, normal operation, regulation and control, normal shutdown and emergency shutdown
 - 4. Lubrication and detailed maintenance instructions. Maintenance instructions are to include detailed drawings giving location of each maintainable part and lubrication point and detailed instructions on disassembly and reassembly of equipment
 - 5. Troubleshooting guide
 - 6. Complete spare parts list with predicted life of parts subject to wear, lists of spare parts recommended on hand for both initial start-up and for normal operating inventory, and local or nearest source of spare parts availability
 - 7. Outline, cross-section, and assembly drawings; engineering data; wiring diagram
 - 8. Test data and performance curves
- B. Furnish parts manuals for equipment. Manual must be prepared by equipment manufacturers, furnished to Owner's Representative and, as minimum, contain following:
 - 1. Detailed drawings giving location of each maintainable part
 - 2. Complete spare parts list with predicted life of parts subject to wear, lists of spare parts recommended on hand for both initial start-up and for normal

operating inventory, and local or nearest source of spare parts availability including local contact information.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

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SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Maintenance and Submittal.
2. Recording.
3. Submittals.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Proposing Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Maintain one record copy of documents at site in accordance with Specification Section 00 72 00 – General Conditions of the Contract.
- B. Store Record Documents and samples in field office when field office is required by Contract, or in secure location. Provide files, racks, and secure storage for Record Documents and samples.
- C. Label each document "PROJECT RECORD" in neat, large, printed letters.
- D. Maintain Record Documents in clean dry and legible condition. Do not use Record Documents for construction purposes.
- E. Keep Record Documents and Samples available for inspection by Owner's Representative.
- F. Bring Record Drawings to progress review meetings for viewing by Owner's Representative.

1.4 RECORDING

- A. Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
- B. Contract Drawings: Legibly mark each item to record actual construction, or "as built" conditions, including:
 1. Measured depths of elements of foundation in relation to finish first floor datum.

2. Measured horizontal locations and elevations of underground utilities and appurtenances, referenced to permanent surface improvements.
 3. Elevations of underground utilities referenced to bench mark utilized for Project.
 4. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of construction.
 5. Field changes of dimension and detail.
 6. Modifications made by Change Order.
 7. Details not on original Contract Drawings.
 8. References to related shop drawings and modifications.
- C. Maintain on site at all times an instrument for accurately measuring elevations. Survey every joint of water main at time of construction and record on drawings water main invert elevation, including elevation top of manway and centerline horizontal location relative to baseline.
- D. Record information with red felt-tip marking pen on set of blue line opaque drawings.
- E. Legibly mark Record Drawings 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. Legibly annotate shop drawings to record changes made after review.

1.5 SUBMITTALS

- A. At Contract closeout, deliver Project Record Documents to Owner's Representative.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 03 09 00

CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place concrete and grout.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 - General Requirements.

1.2 MEASUREMENT AND PAYMENT

- A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 QUALITY ASSURANCE

A. Referenced Standards:

1. American Concrete Institute (ACI):
 - a. 116R, Cement and Concrete Terminology.
 - b. 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
 - c. 212.3R, Chemical Admixtures for Concrete.
 - d. 304R, Guide for Measuring, Mixing, Transporting, and Placing Concrete.
 - e. 304.2R, Placing Concrete by Pumping Methods.
 - f. 305R, Hot Weather Concreting.
 - g. 306R, Cold Weather Concreting.
 - h. 318, Building Code Requirements for Structural Concrete.
 - i. 347R, Recommended Practice for Concrete Formwork.
2. ASTM International (ASTM):
 - a. A82, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - b. A185, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

- c. A615, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
- d. A775, Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
- e. C31, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
- f. C33, Standard Specification for Concrete Aggregates.
- g. C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- h. C94, Standard Specification for Ready-Mixed Concrete.
- i. C138, Standard Method of Test for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
- j. C143, Standard Test Method for Slump of Hydraulic Cement Concrete.
- k. C150, Standard Specification for Portland Cement.
- l. C157, Standard Test Method for Length Change of Hardened Hydraulic-Cement, Mortar, and Concrete.
- m. C172, Standard Practice for Sampling Freshly Mixed Concrete.
- n. C173, Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
- o. C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
- p. C260, Standard Specification for Air-Entraining Admixtures for Concrete.
- q. C289, Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method).
- r. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- s. C494, Standard Specification for Chemical Admixtures for Concrete.
- t. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- u. C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
- v. D882, Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
- w. D994, Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
- x. D1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.

- y. D1709, Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.
 - z. D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - aa. E96, Standard Test Methods for Water Vapor Transmission of Materials.
 - bb. E329, Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.
 - cc. E1745, Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
3. Corps of Engineers (COE):
- a. CRD-C572, Specifications for Polyvinylchloride Waterstops.
 - b. CRD-C621, Standard Specification for Packaged, Dry, Hydraulic-Cement Grout (Nonshrink).
- B. Quality Control:
- 1. Concrete testing agency:
 - a. Contractor to employ and pay for services of a testing laboratory to:
 - 1) Perform materials evaluation.
 - 2) Design concrete mixes.
 - b. Concrete testing agency to meet requirements of ASTM E329.
 - 2. Do not begin concrete production until proposed concrete mix design has been approved by Owner's Representative.
 - a. Approval of concrete mix design by Owner's Representative does not relieve Contractor of his responsibility to provide concrete that meets the requirements of this Specification.
 - 3. Adjust concrete mix designs when material characteristics, job conditions, weather, strength test results or other circumstances warrant.
 - a. Do not use revised concrete mixes until submitted to and approved by Owner's Representative.
 - 4. Perform structural calculations as required to prove that all portions of the structure in combination with remaining forming and shoring system has sufficient strength to safely support its own weight plus the loads placed thereon.
- C. Qualifications:
- 1. Ready mixed concrete batch plant certified by National Ready Mixed Concrete Association (NRMCA).

2. Formwork, shoring and reshoring for slabs and beams except where cast on ground to be designed by a professional engineer currently registered in the state where the Project is located.

1.4 DEFINITIONS

A. Per ACI 116R except as modified herein:

1. Concrete fill: Non-structural concrete.
2. Concrete Testing Agency: Testing agency employed to perform materials evaluation, design of concrete mixes or testing of concrete placed during construction.
3. Exposed concrete: Exposed to view after construction is complete.
4. Indicated: Indicated by Contract Documents.
5. Lean concrete: Concrete with low cement content.
6. Nonexposed concrete: Not exposed to view after construction is complete.
7. Required: Required by Contract Documents.
8. Specified strength: Specified compressive strength at 28 days.
9. Submitted: Submitted to Owner's Representative.

1.5 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
2. Concrete mix designs proposed for use.
 - a. Concrete mix design submittal to include the following information:
 - 1) Sieve analysis and source of fine and coarse aggregates.
 - 2) Test for aggregate organic impurities.
 - 3) Test for deleterious aggregate per ASTM C289.
 - 4) Proportioning of all materials.
 - 5) Type of cement with mill certificate for cement.
 - 6) Type of fly ash with certificate of conformance to specification requirements.
 - 7) Slump.
 - 8) Air content.
 - 9) Brand, type, ASTM designation, and quantity of each admixture proposed for use.
 - 10) 28-day cylinder compressive test results of trial mixes per ACI 318 and as indicated herein.

- 11) Shrinkage test results.
- 12) Standard deviation value for concrete production facility.
- 3. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturers and types:
 - 1) Joint fillers.
 - 2) Curing agents.
 - 3) Chemical sealer.
 - 4) Bonding and patching mortar.
 - 5) Construction joint bonding adhesive.
 - 6) Non-shrink grout with cure/seal compound.
 - 7) Waterstops.
- 4. Reinforcing steel:
 - a. Show grade, sizes, number, configuration, spacing, location and all fabrication and placement details.
 - b. In sufficient detail to permit installation of reinforcing without having to make reference to Contract Drawings.
 - c. Obtain approval of Shop Drawings by Owner's Representative before fabrication.
 - d. Mill certificates.
- 5. Strength test results of in place concrete including slump, air content and concrete temperature.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage of Material:

- 1. Cement and fly ash:
 - a. Store in moistureproof, weathertight enclosures.
 - b. Do not use if caked or lumpy.
- 2. Aggregate:
 - a. Store to prevent segregation and contamination with other sizes or foreign materials.
 - b. Obtain samples for testing from aggregates at point of batching.
 - c. Do not use frozen or partially frozen aggregates.

- d. Do not use bottom 6 IN of stockpiles in contact with ground.
- e. Allow sand to drain until moisture content is uniform prior to use.
- 3. Admixtures:
 - a. Protect from contamination, evaporation, freezing, or damage.
 - b. Maintain within temperature range recommended by manufacturer.
 - c. Completely mix solutions and suspensions prior to use.
- 4. Reinforcing steel: Support and store all rebars above ground.
- B. Delivery:
 - 1. Concrete:
 - a. Prepare a delivery ticket for each load for ready-mixed concrete.
 - b. Truck operator shall hand ticket to Owner's Representative at the time of delivery.
 - c. Ticket to show:
 - 1) Mix identification mark.
 - 2) Quantity delivered.
 - 3) Amount of each material in batch.
 - 4) Outdoor temp in the shade.
 - 5) Time at which cement was added.
 - 6) Numerical sequence of the delivery.
 - 7) Amount of water added.
 - 2. Reinforcing steel:
 - a. Ship to jobsite with attached plastic or metal tags with permanent mark numbers.
 - b. Mark numbers to match Shop Drawing mark number.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following products and manufacturers are acceptable:
 - 1. Nonshrink, nonmetallic grout:
 - a. Sika "SikaGrout 212."
 - b. Euclid Chemical "NS Grout."

- c. BASF Admixtures, Inc. "Masterflow 713."
 - 2. Epoxy grout:
 - a. BASF Admixtures, Inc. "Brutem MPG."
 - b. Euclid Chemical Company, "E3-G."
 - c. Fosroc, "Conbextra EPHF".
 - 3. Expansion joint fillers:
 - a. Permaglaze Co.
 - b. Rubatex Corp.
 - c. Williams Products, Inc.
 - 4. Waterstops, PVC:
 - a. Greenstreak Plastic Products, Inc.
 - b. W. R. Meadows, Inc.
 - c. Burke Company.
 - 5. Form coating:
 - a. Richmond "Rich Cote."
 - b. Industrial Lubricants "Nox-Crete Form Coating."
 - c. Euclid Chemical "Eucoslip VOX."
 - 6. Prefabricated forms:
 - a. Simplex "Industrial Steel Frame Forms."
 - b. Symons "Steel Ply."
 - c. Universal "Uniform."
 - 7. Chemical sealer:
 - a. L&M Construction Chemicals, Inc.
 - b. Euclid Chemical Company.
 - c. Dayton Superior.
 - 8. Bonding agent:
 - a. Euclid Chemical Co.
 - b. BASF Admixtures, Inc.
 - c. L&M Construction Chemicals Inc.
- B. Submit request for substitution in accordance with Specification Section 01 25
13 – Product Substitutions.

2.2 MATERIALS

- A. Portland Cement: Conform to ASTM C150 Type I.

B. Fly Ash:

1. ASTM C618, Class F or Class C.
2. Nonstaining.
 - a. Hardened concrete containing fly ash to be uniform light gray color.
3. Maximum loss on ignition: 4 percent.
4. Compatible with other concrete ingredients.
5. Obtain proposed fly ash from a source approved by the State Highway Department in the state where the Project is located for use in concrete for bridges.

C. Admixtures:

1. Air entraining admixtures: ASTM C260.
2. Water reducing, retarding, and accelerating admixtures:
 - a. ASTM C494 Type A through E.
 - b. Conform to provisions of ACI 212.3R.
 - c. Do not use retarding or accelerating admixtures unless specifically approved in writing by Owner's Representative and at no cost to Owner.
 - d. Follow manufacturer's instructions.
 - e. Use chloride free admixtures only.
3. Maximum total water soluble chloride ion content contributed from all ingredients of concrete including water, aggregates, cementitious materials and admixtures by weight percent of cement:
 - a. 0.10 all concrete.
4. Do not use calcium chloride.
5. Pozzolanic admixtures: ASTM C618.
6. Provide admixtures of same type, manufacturer and quantity as used in establishing required concrete proportions in the mix design.

D. Water: Potable, clean, free of oils, acids and organic matter.

E. Aggregates:

1. Normal weight concrete: ASTM C33, except as modified below.
2. Fine aggregate:
 - a. Clean natural sand.
 - b. No manufactured or artificial sand.
3. Coarse aggregate:
 - a. Crushed rock, natural gravel, or other inert granular material.

- b. Maximum amount of clay or shale particles: 1 percent.
- 4. Gradation of coarse aggregate:
 - a. Lean concrete and concrete topping: Size #7.
 - b. All other concrete: Size #57 or #67.
- F. Concrete Grout:
 - 1. Nonshrink nonmetallic grout:
 - a. Nonmetallic, noncorrosive, nonstaining, premixed with only water to be added.
 - b. Grout to produce a positive but controlled expansion.
 - c. Mass expansion not to be created by gas liberation.
 - d. Minimum compressive strength of nonshrink grout at 28 days: 6500 psi.
 - e. In accordance with COE CRD-C621.
 - 2. Epoxy grout:
 - a. 3-component epoxy resin system.
 - 1) Two liquid epoxy components.
 - 2) One inert aggregate filler component.
 - b. Each component packaged separately for mixing at jobsite.
- G. Reinforcing Steel:
 - 1. Reinforcing bars: ASTM A615, Grade 60.
 - 2. Welded wire reinforcement: ASTM A185.
 - a. Minimum yield strength: 60,000 psi.
 - 3. Column spirals: ASTM A82.
- H. Forms:
 - 1. Prefabricated or job built.
 - 2. Wood forms:
 - a. New 5/8 or 3/4 IN 5-ply structural plywood of concrete form grade.
 - b. Built-in-place or prefabricated type panel.
 - c. 4 x 8 FT sheets for built-in-place type except where smaller pieces will cover entire area.
 - d. When approved, plywood may be reused.
 - 3. Metal forms:
 - a. Metal forms excluding aluminum may be used.

- b. Forms to be tight to prevent leakage, free of rust and straight without dents to provide members of uniform thickness.
- 4. Chamfer strips: Clear white pine, surface against concrete planed.
- 5. Form ties:
 - a. Removable end, permanently embedded body type with cones on outer ends not requiring auxiliary spreaders.
 - b. Cone diameter: 3/4 IN minimum to 1 IN maximum.
 - c. Embedded portion 1-1/2 IN minimum back from concrete face.
 - d. If not provided with threaded ends, constructed for breaking off ends without damage to concrete.
 - e. Provide ties with built-in waterstops at all walls that will be in contact with process liquid during plant operation.
- 6. Form release: Nonstaining and shall not prevent bonding of future finishes to concrete surface.
- I. Waterstops:
 - 1. Plastic: COE CRD-C572.
 - 2. Serrated with center bulb.
 - 3. Thickness: 3/8 IN.
 - 4. Length (general use): 6 IN unless indicated otherwise.
 - 5. Expansion joints:
 - a. Length: 9 IN.
 - b. Center bulb: 1 IN OD x 1/2 IN ID.
 - 6. Provide hog rings or grommets spaced at maximum 12 IN OC along the length of the water stop.
 - 7. Provide factory made waterstop fabrications at all changes of direction, intersections and transitions leaving only straight butt splices for the field.
- J. Chairs, Runners, Bolsters, Spacers, and Hangers:
 - 1. Stainless steel, epoxy coated, plastic, brick, or plastic coated metal.
 - a. Plastic coated: Rebar support tips in contact with the forms only.
- K. Chemical Floor Sealer:
 - 1. Colorless low VOC water-based solution containing acrylic copolymers.
 - a. ASTM C1315, Class B, minimum 30 percent solids.
 - 2. L&M Construction Chemicals Inc. Dress & Seal WB 30.
- L. Vapor Retarder:
 - 1. ASTM E1745, Class A, minimum 15 mil thickness.

2. Water vapor permeance: 0.03 maximum per ASTM E96.
3. Puncture resistance: ASTM D1709, Method B, 2200 grams.
4. Minimum tensile strength: 45 LBS/IN, ASTM D882.
5. Vapor retarder tape: As recommended by vapor retarder manufacturer.

M. Membrane Curing Compound:

1. ASTM C309, Type I-D.
2. Resin based, dissipates upon exposure to UV light.
3. Curing compound shall not prevent bonding of any future coverings, coatings or finishes.
4. Curing compounds used in water treatment plant construction to be nontoxic and taste and odor free.

N. Bonding Agent:

1. High solids acrylic latex base liquid for interior or exterior application as a bonding agent to improve adhesion and mechanical properties of concrete patching mortars.
2. Euclid Chemical Co. "Flex-Con."
3. BASF Admixtures, Inc. "Acryl-Set."
4. L&M Construction Chemicals "Everbond."
5. Thoro System Products "Acryl 60."

O. Expansion Joint Filler:

1. In contact with water or sewage:
 - a. Closed cell neoprene.
 - b. ASTM D1056, Class SC (oil resistant and medium swell) of 2 to 5 psi compression deflection (Grade SCE41).
2. Exterior driveways, curbs and sidewalks:
 - a. Asphalt expansion joint filler.
 - b. ASTM D994.
3. Other use:
 - a. Fiber expansion joint filler.
 - b. ASTM D1751.

2.3 CONCRETE MIXES

A. General:

1. All concrete to be ready mixed concrete conforming to ASTM C94.

2. Provide concrete of specified quality capable of being placed without segregation and, when cured, of developing all properties required.
3. All concrete to be normal weight concrete.

B. Strength:

1. Provide specified strength and type of concrete for each use in structure(s) as follows:

TYPE	WEIGHT	SPECIFIED STRENGTH*
Concrete fill	Normal weight	3000 psi
Lean concrete	Normal weight	3000 psi
Concrete topping	Normal weight	4000 psi
Precast concrete	Normal weight and lightweight	5000 psi
All other general use concrete	Normal weight	4000 psi

* Minimum 28-day compressive strength.

C. Air Entrainment:

1. Provide air entrainment in all concrete resulting in a total air content percent by volume as follows:

MAX AGGREGATE SIZE	TOTAL AIR CONTENT PERCENT
1 IN or 3/4 IN	5 to 7
1/2 IN	5 1/2 to 8

2. Air content to be measured in accordance with ASTM C231, ASTM C173, or ASTM C138.

D. Slump - 4 IN maximum, 1 IN minimum:

1. Measured at point of discharge of the concrete into the concrete construction member.
2. Concrete of lower than minimum slump may be used provided it can be properly placed and consolidated.
3. Pumped concrete:
 - a. Provide additional water at batch plant to allow for slump loss due to pumping.
 - b. Provide only enough additional water so that slump of concrete at discharge end of pump hose does not exceed maximum slump specified above.

4. Determine slump per ASTM C143.
- E. Selection of Proportions:
 1. General:
 - a. Proportion ingredients to:
 - 1) Produce proper workability, durability, strength, and other required properties.
 - 2) Prevent segregation and collection of excessive free water on surface.
 2. Minimum cement contents and maximum water cement ratios for concrete to be as follows:

SPECIFIED STRENGTH	MINIMUM CEMENT, LB/CY MAXIMUM AGGREGATE SIZE			MAXIMUM WATER CEMENT RATIO BY WEIGHT
	1/2 IN	3/4 IN	1 IN	
3000	---	517	517	0.45
4000	611	611	611	0.45
5000	---	686	665	0.40

3. Substitution of fly ash: Maximum of 25 percent by weight of cement at rate of 1 LB fly ash for 1 LB of cement.
4. Sand cement grout:
 - a. Three parts sand.
 - b. One part Portland cement.
 - c. Entrained air: Six percent plus or minus one percent.
 - d. Sufficient water for required workability.
 - e. Minimum 28-day compressive strength: 3,000 psi.
5. Pan stair fill:
 - a. Coarse aggregate: 100 percent passing a 1/2 IN sieve.
 - b. Proportions:
 - 1) 1 sack cement.
 - 2) 150 LBS coarse aggregate.
 - 3) 150 LBS fine aggregate (sand).
 - c. Adjust mix to obtain satisfactory finishing.
6. Normal weight concrete:
 - a. Proportion mixture to provide desired characteristics using one of methods described below:

- 1) Method 1 (Trial Mix): Per ACI 318, Chapter 5, except as modified herein.
 - a) Air content within range specified above.
 - b) Record and report temperature of trial mixes.
 - c) Proportion trial mixes per ACI 211.1.
 - 2) Method 2 (Field Experience): Per ACI 318, Chapter 5, except as modified herein:
 - a) Field test records must be acceptable to Owner's Representative to use this method.
 - b) Test records shall represent materials, proportions and conditions similar to those specified.
 7. Required average strength to exceed the specified 28-day compressive strength by the amount determined or calculated in accordance with the requirements of Paragraph 5.3 of ACI 318 using the standard deviation of the proposed concrete production facility as described in Paragraph 5.3.1 of ACI 318.
- F. Allowable Shrinkage: 0.048 percent per ASTM C157.

PART 3 - EXECUTION

3.1 FORMING AND PLACING CONCRETE

- A. Formwork:
1. Contractor is responsible for design and erection of formwork.
 2. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation and position.
 - a. Allowable tolerances: As recommended in ACI 347R.
 3. Provide slabs and beams of minimum indicated depth when sloping foundation base slabs or elevated floor slabs to drains.
 - a. For slabs on grade, slope top of subgrade to provide floor slabs of minimum uniform indicated depth.
 - b. Do not place floor drains through beams.
 4. Openings: Provide openings in formwork to accommodate work of other trades.
 - a. Accurately place and securely support items built into forms.
 5. Chamfer strips: Place 3/4 IN chamfer strips in forms to produce 3/4 IN wide beveled edges on permanently exposed corners of members.

6. Clean and adjust forms prior to concrete placement.
7. Tighten forms to prevent mortar leakage.
8. Coat form surfaces with form release agents prior to placing reinforcing bars in forms.

B. Reinforcement:

1. Position, support and secure reinforcement against displacement.
2. Locate and support with chairs, runners, bolsters, spacers and hangers, as required.
3. Set wire ties so ends do not touch forms and are directed into concrete, not toward exposed concrete surfaces.
4. Lap splice lengths: ACI 318 Class B top bar tension splices unless indicated otherwise on the Drawings.
5. Extend reinforcement to within 2 IN of concrete perimeter edges.
 - a. If perimeter edge is earth formed, extend reinforcement to within 3 IN of the edge.
6. Minimum concrete protective covering for reinforcement: As shown on Drawings.
7. Do not weld reinforcing bars.
8. Welded wire reinforcement:
 - a. Install welded wire reinforcement in maximum practical sizes.
 - b. Splice sides and ends with a splice lap length measured between outermost cross wires of each fabric sheet not less than:
 - 1) One spacing of cross wires plus 2 IN.
 - 2) 1.5 x development length.
 - 3) 6 IN.
 - c. Development length: ACI 318 basic development length for the specified fabric yield strength.
9. Provide at locations indicated.
10. Locate wall vertical construction joints at 30 FT maximum centers and wall horizontal construction joints at 10 FT maximum centers.
11. Locate construction joints in floor slabs and foundation base slabs so that concrete placements are approximately square and do not exceed 2500 SF.
12. Locate construction joints in columns and walls:
 - a. At the underside of beams, girders, haunches, drop panels, column capitals, and at floor panels.

- b. Haunches, drop panels, and column capitals are considered part of the supported floor or roof and shall be placed monolithically therewith.
 - c. Column based need not be placed monolithically with the floor below.
 - 13. Locate construction joints in beams and girders:
 - a. At the middle of the span, unless a beam intersects a girder at that point.
 - b. If the middle of the span is at an intersection of a beam and girder, offset the joint in the girder a distance equal to twice the beam width.
 - c. Provide satisfactory means for transferring shear and other forces through the construction joint.
 - 14. Locate construction joints in suspended slabs:
 - a. At or near the center of span in flat slab or T-beam construction.
 - b. Do not locate a joint between a slab and a concrete beam or girder unless so indicated on Drawings.
 - 15. In pan-formed joists:
 - a. At or near span center when perpendicular to the joists.
 - b. Centered in the slab, midway between joists, when parallel to the joists.
 - 16. Install construction joints perpendicular to main reinforcement with all reinforcement continued across construction joints.
 - 17. At least 48 HRS shall elapse between placing of adjoining concrete construction.
 - 18. Thoroughly clean and remove all laitance and loose and foreign particles from construction joints.
 - 19. Before new concrete is placed, coat all construction joints with an approved bonding adhesive used and applied in accordance with manufacturer's instructions.
- C. Embedments:
- 1. Set and build in anchorage devices and other embedded items required for other work that is attached to, or supported by concrete.
 - 2. Use setting diagrams, templates and instructions for locating and setting.
 - 3. Secure waterstops in correct position using hog rings or grommets spaced along the length of the waterstop and wire tie to adjacent reinforcing steel.
- D. Placing Concrete:
- 1. Place concrete in compliance with ACI 304R and ACI 304.2R.
 - 2. Place in a continuous operation within planned joints or sections.
 - 3. Begin placement when work of other trades affecting concrete is completed.
 - 4. Place concrete by methods which prevent aggregate segregation.

5. Do not allow concrete to free fall more than 4 FT.
 6. Where free fall of concrete will exceed 4 FT, place concrete by means of tremie pipe or chute.
- E. Consolidation: Consolidate all concrete using mechanical vibrators supplemented with hand rodding and tamping, so that concrete is worked around reinforcement and embedded items into all parts of forms.
- F. Protection:
1. Protect concrete from physical damage or reduced strength due to weather extremes.
 2. In cold weather comply with ACI 306R except as modified herein.
 - a. Do not place concrete on frozen ground or in contact with forms or reinforcing bars coated with frost, ice or snow.
 - b. Minimum concrete temperature at the time of mixing:

OUTDOOR TEMPERATURE AT PLACEMENT (IN SHADE)	CONCRETE TEMPERATURE AT MIXING
Below 30 DegF	70 DegF
Between 30-45 DegF	60 DegF
Above 45 DegF	50 DegF

- c. Do not place heated concrete that is warmer than 80 DegF.
 - d. If freezing temperatures are expected during curing, maintain the concrete temperature at or above 50 DegF for 7 days or 70 DegF for 3 days.
 - e. Do not allow concrete to cool suddenly.
 3. In hot weather comply with ACI 305R except as modified herein.
 - a. At air temperature of 95 DegF and above, keep concrete as cool as possible during placement and curing.
 - b. Do not allow concrete temperature to exceed 95 DegF at placement.
 - c. Prevent plastic shrinkage cracking due to rapid evaporation of moisture.
 - d. Do not place concrete when the actual or anticipated evaporation rate equals or exceeds 0.2 LBS/SF/HR as determined from ACI 305R, Figure 2.1.5.
- G. Curing:
1. Begin curing concrete as soon as free water has disappeared from exposed surfaces.

2. Cure concrete by use of moisture retaining cover, burlap kept continuously wet or by membrane curing compound.
3. Provide protection as required to prevent damage to concrete and to prevent moisture loss from concrete during curing period.
4. Provide curing for minimum of 7 days.
5. Form materials left in place may be considered as curing materials for surfaces in contact with the form materials except in periods of hot weather.
6. In hot weather follow curing procedures outlined in ACI 305R.
7. In cold weather follow curing procedures outlined in ACI 306R.
8. If forms are removed before 7 days have elapsed, finish curing of formed surfaces by one of above methods for the remainder of the curing period.
9. Curing vertical surfaces with a curing compound:
 - a. Cover vertical surfaces with a minimum of two coats of the curing compound.
 - b. Allow the preceding coat to completely dry prior to applying the next coat.
 - c. Apply the first coat of curing compound immediately after form removal.
 - d. Vertical surface at the time of receiving the first coat shall be damp with no free water on the surface.
 - e. A vertical surface is defined as any surface steeper than 1 vertical to 4 horizontal.

H. Form Removal:

1. Remove forms after concrete has hardened sufficiently to resist damage from removal operations or lack of support.
2. Where no reshoring is planned, leave forms and shoring used to support concrete until it has reached its specified 28-day compressive strength.
3. Where reshoring is planned, supporting formwork may be removed when concrete has sufficient strength to safely support its own weight and loads placed thereon.
 - a. While reshoring is underway, no superimposed loads shall be permitted on the new construction.
 - b. Place reshores as soon as practicable after stripping operations are complete but in no case later than the end of working day on which stripping occurs.
 - c. Tighten reshores to carry their required loads.
 - d. Leave reshores in place until concrete being supported has reached its specified 28-day compressive strength.

3.2 CONCRETE FINISHES

A. Tolerances:

1. Class A: 1/8 IN in 10 FT.
2. Class B: 1/4 IN in 10 FT.

B. Surfaces Exposed to View:

1. Provide a smooth finish for exposed concrete surfaces and surfaces that are:
 - a. To be covered with a coating or covering material applied directly to concrete.
 - b. Scheduled for grout cleaned finish.
2. Remove fins and projections, and patch voids, air pockets, and honeycomb areas with cement grout.
3. Fill tie holes with nonshrink nonmetallic grout.

C. Surfaces Not Exposed to View:

1. Patch voids, air pockets and honeycomb areas with cement grout.
2. Fill tie holes with nonshrink nonmetallic grout.

D. Grout Cleaned Finish:

1. Mix one part Portland cement and 1-1/2 parts fine sand with sufficient bonding agent/water mixture to produce a grout with the consistency of thick paint.
 - a. White Portland cement shall be substituted for gray Portland cement to produce a color that matches color of surrounding concrete as determined by trial patch for areas not to be painted.
2. Wet surface of concrete to prevent absorption of water by grout and uniformly apply grout with brushes or spray gun.
3. Immediately scrub the surface with a cork float or stone to coat and fill air bubbles and holes.
4. While grout is still plastic, remove all excess grout by working surface with rubber float, sack or other approved means.
5. After the surface whitens from drying, rub vigorously with clean burlap.
6. Keep final finish damp for a minimum of 36 HRS after final rubbing.

E. Slab Float Finish:

1. After concrete has been placed, consolidated, struck off, and leveled, do no further work until ready for floating.
2. Begin floating when water sheen has disappeared and surface has stiffened sufficiently to permit operation.

3. During or after first floating, check planeness of entire surface with a 10 FT straightedge applied at not less than two different angles.
 4. Cut down all high spots and fill all low spots during this procedure to produce a surface within Class B tolerance throughout.
 5. Refloat slab immediately to a uniform sandy texture.
- F. Troweled Finish:
1. Float finish surface.
 2. Next power trowel, and finally hand trowel.
 3. Produce a smooth surface which is relatively free of defects with first hand troweling.
 4. Perform additional trowelings by hand after surface has hardened sufficiently.
 5. Final trowel when a ringing sound is produced as trowel is moved over surface.
 6. Thoroughly consolidate surface by hand troweling.
 7. Leave finished surface essentially free of trowel marks, uniform in texture and appearance and plane to a Class A tolerance.
 8. On surfaces intended to support floor coverings remove any defects of sufficient magnitude that would show through floor covering by grinding.
- G. Broom Finish: Immediately after concrete has received a float finish as specified, give it a transverse scored texture by drawing a broom across surface.
- H. Apply chemical floor hardener to permanently exposed interior concrete floor slab surfaces where indicated.
1. Apply in accordance with manufacturer's instructions.

3.3 GROUT

- A. Preparation:
1. Nonshrinking nonmetallic grout:
 - a. Clean concrete surface to receive grout.
 - b. Saturate concrete with water for 24 HRS prior to grouting.
 2. Rock anchors:
 - a. Clean rock anchors of all loose material.
 - b. Orient hook or bends in anchor bars to clear anchor bolts, reinforcements, and other embedments to be installed later.
 3. Epoxy grout: Apply only to clean, dry, roughened, sound surface.
- B. Application:

1. Nonshrinking nonmetallic grout:
 - a. Mix in a mechanical mixer.
 - b. Use no more water than necessary to produce flowable grout.
 - c. Place in accordance with manufacturer's instructions.
 - d. Completely fill all spaces and cavities below the bottom of baseplates.
 - e. Provide forms where baseplates and bedplates do not confine grout.
 - f. Where exposed to view, finish grout edges smooth.
 - g. Except where a slope is indicated on Drawings, finish edges flush at the baseplate, bedplate, member, or piece of equipment.
 - h. Protect against rapid moisture loss by covering with wet rags or polyethylene sheets.
 - i. Wet cure grout for seven (7) days, minimum.
2. Rock anchors:
 - a. See Item 1 above.
 - b. If rodded:
 - 1) Fill each hole so that it overflows when anchor bar is inserted.
 - 2) Force anchor bars into place.
 - c. If pressure placed, set anchor bar before grouting.
 - d. Take special care to avoid any movement of anchors that have been placed.
3. Epoxy grout:
 - a. Mix and place in accordance with manufacturer's instructions.
 - b. Completely fill all cavities and spaces around dowels and anchors without voids.
 - c. Obtain manufacturer's field technical assistance as required to ensure proper placement.

3.4 FIELD QUALITY CONTROL

- A. Owner will employ and pay for services of a concrete testing laboratory to perform testing of concrete placed during construction.
 1. Contractor to cooperate with Owner in obtaining and testing samples.
- B. Tests During Construction:
 1. Strength test - procedure:
 - a. Three cylinders, 6 IN DIA x 12 IN high, will be taken from each sample per ASTM C172 and ASTM C31.
 - b. Cylinders will be tested per ASTM C39:

- 1) One at 7 days.
- 2) Two at 28 days.
2. Strength test - frequency:
 - a. Not less than one test each day concrete placed.
 - b. Not less than one test for each 50 CY or major fraction thereof placed in one day.
 - c. Not less than one test for each type of concrete poured.
 - d. Not less than one test for each concrete structure exceeding 2 CY volume.
3. Slump test:
 - a. Per ASTM C143.
 - b. Determined for each strength test sample.
 - c. Additional slump tests may be taken.
4. Air content:
 - a. Per ASTM C231, ASTM C173, and ASTM C138.
 - b. Determined for each strength test sample.
5. Temperature: Determined for each strength test sample.
- C. Evaluation of Tests:
 1. Strength test results:
 - a. Average of 28-day strength of two cylinders from each sample.
 - 1) If one cylinder manifests evidence of improper sampling, molding, handling, curing or testing, strength of remaining cylinder will be test result.
 - 2) If both cylinders show any of above defects, test will be discarded.
- D. Acceptance of Concrete:
 1. Strength level of each type of concrete shall be considered satisfactory if both of the following requirements are met:
 - a. Average of all sets of three consecutive strength tests equals or exceeds the required specified 28-day compressive strength.
 - b. No individual strength test falls below the required specified 28-day compressive strength by more than 500 psi.
 2. If tests fail to indicate satisfactory strength level, perform additional tests and/or corrective measures as directed by Owner's Representative.
 - a. Perform additional tests and/or corrective measures at no additional cost to Owner.

3.5 SCHEDULES

A. Form Types:

1. Surfaces exposed to view:
 - a. Prefabricated or job-built wood forms.
 - b. Laid out in a regular and uniform pattern with long dimensions vertical and joints aligned.
 - c. Produce finished surfaces free from offsets, ridges, waves, and concave or convex areas.
 - d. Construct forms sufficiently tight to prevent leakage of mortar.
2. Surfaces normally submerged or not normally exposed to view: Wood or steel forms sufficiently tight to prevent leakage of mortar.
3. Other types of forms may be used:
 - a. For surfaces not restricted to plywood or lined forms.
 - b. As backing for form lining.

B. Grout:

1. Nonshrinking nonmetallic grout: General use.
2. Epoxy grout:
 - a. Grouting of dowels and anchor bolts into existing concrete.
 - b. Other uses indicated on Drawings.
3. Sand cement grout: Keyways of precast members.

C. Concrete:

1. Precast concrete: Where indicated on Drawings.
2. Lean concrete: Where indicated on Drawings.
3. Concrete fill: Where indicated on Drawings.
4. Lightweight concrete: Where indicated on Drawings.
5. Normal weight concrete: All concrete.
6. Concrete pan fill: Stair and landings where indicated on Drawings.
7. General use concrete: All other locations.

D. Concrete Finishes:

1. Grout cleaned finish: Where indicated on Drawings.
2. Slab finishes:
 - a. Use following finishes as applicable, unless otherwise indicated:
 - 1) Floated finish: Surfaces intended to receive roofing, concrete topping, lean concrete, concrete fill and waterproofing.

- 2) Troweled finish: Interior floor slabs, exposed roof slabs and base slabs of structures, equipment bases, and column bases.
- 3) Broom finish: Sidewalks, docks, concrete stairs, and ramps.

3.6 OWNER TRAINING (NOT USED)

END OF SECTION

SECTION 10 14 00
IDENTIFICATION DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Tag, tape and stenciling systems for equipment, piping, valves, pumps, ductwork and similar items, and hazard and safety signs.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

B. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.3 QUALITY ASSURANCE

A. Referenced Standards:

1. American Society of Mechanical Engineers (ASME):
 - a. A13.1 – Scheme for the Identification of Piping Systems.
2. Instrumentation, Systems, and Automation Society (ISA).
3. National Electrical Manufacturers Association/American National Standards Institute (NEMA/ANSI):
 - a. Z535.1 – Safety Color Code.
 - b. Z535.2 – Environmental and Facility Safety Signs.
 - c. Z535.3 – Criteria for Safety Symbols.
 - d. Z535.4 – Product Safety Signs and Labels.
4. National Fire Protection Association (NFPA):
 - a. 70 – National Electrical Code (NEC).
5. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910.145 – Specification for Accident Prevention Signs and Tags.

1.4 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
2. Product technical data including:
 - a. Catalog information for all identification systems.
 - b. Acknowledgement that products submitted meet requirements of standards referenced.
3. Identification register, listing all items in PART 3 of this Specification Section to be identified, type of identification system to be used, lettering, location and color.

1.5 WARRANTY (NOT USED)

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 1. W.H. Brady Co.
 2. Panduit.
 3. Seton.
 4. National Band and Tag Co.
 5. Carlton Industries, Inc.
- B. Submit request for substitution in accordance with Specification Section 01 25 13 – Product Substitutions.

2.2 MANUFACTURED UNITS

- A. Type A1 - Round Metal Tags:
 1. Materials:
 - a. Aluminum or stainless steel.
 - b. Stainless steel shall be used in corrosive environments.
 2. Size:
 - a. Diameter: 1-1/2 IN minimum.
 - b. Thickness: 0.035 IN (20 GA) minimum.
 3. Fabrication:
 - a. 3/16 IN minimum mounting hole.

- b. Legend: Stamped and filled with black coloring.
- 4. Color: Natural.
- B. Type A2 - Rectangle Metal Tags:
 - 1. Materials: Stainless steel.
 - 2. Size:
 - a. 3-1/2 IN x 1-1/2 IN minimum.
 - b. Thickness: 0.036 IN (20 GA) minimum.
 - 3. Fabrication:
 - a. 3/16 IN minimum mounting hole.
 - b. Legend: Stamped and filled with black coloring.
 - 4. Color: Natural.
- C. Type A3 - Metal Tape Tags:
 - 1. Materials: Aluminum or stainless steel.
 - 2. Size:
 - a. Width 1/2 IN minimum.
 - b. Length as required by text.
 - 3. Fabrication:
 - a. 3/16 IN minimum mounting hole.
 - b. Legend: Embossed.
 - 4. Color: Natural.
- D. Type B1- Square Non-Metallic Tags:
 - 1. Materials: Fiberglass reinforced plastic.
 - 2. Size:
 - a. Surface: 2 x 2 IN minimum.
 - b. Thickness: 100 mils.
 - 3. Fabrication:
 - a. 3/16 IN mounting hole with metal eyelet.
 - b. Legend: Preprinted and permanently embedded and fade resistant.
 - 4. Color:
 - a. Background: Manufacturer standard or as specified.
 - b. Lettering: Black.
- E. Type B2 - Non-Metallic Signs:
 - 1. Materials: Fiberglass reinforced or durable plastic.

2. Size:
 - a. Surface: As required by text.
 - b. Thickness: 60 mils minimum.
 3. Fabrication:
 - a. Rounded corners.
 - b. Drilled holes in corners with grommets.
 - c. Legend: Preprinted, permanently embedded and fade resistant for a 10 year minimum outdoor durability.
 4. Color:
 - a. Background: Manufacturer standard or as specified.
 - b. Lettering: Black.
 5. Standards for OSHA signs: NEMA/ANSI Z535.1, NEMA/ANSI Z535.2, NEMA/ANSI Z535.3, NEMA/ANSI Z535.4, OSHA 29 CFR 1910.145.
- F. Type C - Phenolic Name Plates:
1. Materials: Phenolic.
 2. Size:
 - a. Surface: As required by text.
 - b. Thickness: 1/16 IN.
 3. Fabrication:
 - a. Two (2) layers laminated.
 - b. Legend: Engraved through top lamination into bottom lamination.
 - c. Two (2) drilled side holes, for screw mounting.
 4. Color: Black top surface, white core, unless otherwise indicated.
- G. Type D - Self-Adhesive Tape Tags and Signs:
1. Materials: Vinyl tape or vinyl cloth.
 2. Size:
 - a. Surface: As required by text.
 - b. Thickness: 5 mils minimum.
 3. Fabrication:
 - a. Indoor/Outdoor grade.
 - b. Weather and UV resistant inks.
 - c. Permanent adhesive.
 - d. Legend: Preprinted.

- e. Wire markers to be self-laminating.
- 4. Color: White with black lettering or as specified.
- 5. Standards for OSHA signs: NEMA/ANSI Z535.1, NEMA/ANSI Z535.2, NEMA/ANSI Z535.3, NEMA/ANSI Z535.4, OSHA 29 CFR 1910.145.
- H. Type E - Heat Shrinkable Tape Tags:
 - 1. Materials: Polyolefin.
 - 2. Size: As required by text.
 - 3. Fabrication:
 - a. Legend: Preprinted.
 - 4. Color: White background, black printing.
- I. Type F - Underground Warning Tape:
 - 1. Materials: Polyethylene.
 - 2. Size:
 - a. 6 IN wide (minimum).
 - b. Thickness: 3.5 mils.
 - 3. Fabrication:
 - a. Legend: Preprinted and permanently imbedded.
 - b. Message continuous printed.
 - c. Tensile strength: 1750 psi.
 - 4. Color: As specified.
- J. Type G - Stenciling System:
 - 1. Materials:
 - a. Exterior type stenciling enamel.
 - b. Either brushing grade or pressurized spray can form and grade.
 - 2. Size: As required.
 - 3. Fabrication:
 - a. Legend: As required.
 - 4. Color: Black or white for best contrast.
- K. Underground Tracer Wire:
 - 1. Materials:
 - a. Wire:
 - 1) 12 GA AWG.
 - 2) Solid.

- b. Wire nuts: Waterproof type.
- c. Split bolts: Brass.

2.3 ACCESSORIES

A. Fasteners:

- 1. Bead chain: #6 brass, aluminum or stainless steel.
- 2. Plastic strap: Nylon, urethane or polypropylene.
- 3. Screws: Self-tapping, stainless steel.
- 4. Adhesive, solvent activated.

2.4 MAINTENANCE MATERIALS

- ### **A.**
- Where stenciled markers are provided, clean and retain stencils after completion and include in extra stock, along with required stock of paints and applicators.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

- #### **A.**
- Install identification devices at specified locations, and as indicated on the drawings.
- #### **B.**
- All identification devices to be printed by mechanical process, hand printing is not acceptable.
- #### **C.**
- Attach tags to equipment with sufficient surface or body area with solvent activated adhesive applied to back of each tag.
- #### **D.**
- Attach tags with 1/8 IN round or flat head screws to equipment without sufficient surface or body area, or porous surfaces.
- 1. Where attachment with screws should not or cannot penetrate substrate, attach with plastic strap.
- #### **E.**
- Single items of equipment enclosed in a housing or compartment to be tagged on outside of housing.
- 1. Several items of equipment mounted in housing to be individually tagged inside the compartment.
- #### **F. Tracer Wire:**
- 1. Attach to pipe at a maximum of 10 FT intervals with tape or tie-wraps.
 - 2. Continuous pass from each valve box and above grade at each structure.
 - 3. Coil enough wire at each valve box to extend wire a foot above the ground surface.
 - 4. 1,000 FT maximum spacing between valve boxes.
 - 5. If split bolts are used for splicing, wrap with electrical tape.

6. If wire nuts are used for splicing, knot wire at each splice point leaving 6 IN of wire for splicing.
7. Use continuous strand of wire between valve box where possible.
 - a. Continuous length shall be no shorter than 100 FT.

3.2 SCHEDULES

A. Process Systems:

1. General:
 - a. Provide arrows and markers on piping.
 - 1) At 20 FT maximum centers along continuous lines.
 - 2) At changes in direction (route) or obstructions.
 - 3) At valves, risers, "T" joints, machinery or equipment.
 - 4) Where pipes pass through floors, walls, ceilings, cladding assemblies and like obstructions provide markers on both sides.
 - b. Position markers on both sides of pipe with arrow markers pointing in flow direction.
 - 1) If flow is in both directions use double headed arrow markers.
 - c. Apply tapes and stenciling in uniform manner parallel to piping.
2. Trenches with piping:
 - a. Tag type: Type F - Underground Warning Tape
 - b. Location: Halfway between top of piping and finished grade.
 - c. Letter height: 1-1/4 IN minimum.
 - d. Natural gas or digester gas:
 - 1) Color: Yellow with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION"
 - b) Second line: "BURIED GAS LINE BELOW"
 - e. Potable water:
 - 1) Color: Blue with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION"
 - b) Second line: "BURIED WATER LINE BELOW"
 - f. Storm and sanitary sewer lines:
 - 1) Color: Green with black letters.

- 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION"
 - b) Second line: "BURIED SEWER LINE BELOW"
- g. (Nonpotable) water piping, except 3 IN and smaller irrigation pipe:
 - 1) Color: Green with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION"
 - b) Second line: "BURIED NONPOTABLE WATER LINE BELOW"
- h. Chemical feed piping (e.g., chlorine solution, polymer solution, caustic solution, etc.):
 - 1) Color: Yellow with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION"
 - b) Second line: "BURIED CHEMICAL LINE BELOW"
- i. Other piping (e.g., compressed air, irrigation, refrigerant, heating water, etc.):
 - 1) Color: Yellow with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION"
 - b) Second line: "BURIED PIPE LINE BELOW"
- 3. Yard valves, buried, with valve box and concrete pad:
 - a. Tag type: Type A2 - Rectangle Metal Tags.
 - b. Fastener: 3/16 IN x 7/8 IN plastic screw anchor with 1 IN #6 stainless steel pan head screw.
 - c. Legend:
 - 1) Letter height: 1/4 IN minimum.
 - 2) Valve designation as indicated on the Drawings (e.g., "V-xxx").
- 4. Valves and slide gates:
 - a. Tag type:
 - 1) Outdoor locations: Type B1 - Square Non-Metallic Tags.
 - 2) Indoor non-corrosive:
 - a) Type A1 - Round Metal Tags.
 - b) Type B1 - Square Non-Metallic Tags.

- 3) Indoor corrosive:
- 4) Stainless steel Type A1 - Round Metal Tags.
- 5) Type B1 - Square Non-Metallic Tags.
- b. Fastener:
 - 1) Type A1: Chain of the same material.
 - 2) Type B1: Stainless steel chain.
 - a) Color: Per ASME A13.1 corresponding to the piping system.
 - b) Legend:
 - 3) Letter height: 1/4 IN minimum.
 - 4) Valve designation as indicated on the Drawings (e.g., "V-xxx").
- 5. Process equipment (e.g., pumps, pump motors, blowers, air compressors, bar screens, clarifier drive mechanism, etc.):
 - a. Tag type:
 - 1) Type B2 - Non-Metallic Signs.
 - 2) Type D - Self-Adhesive Tape Tags and Signs.
 - 3) Type G - Stenciling System.
 - b. Fastener:
 - 1) Self.
 - 2) Screws.
 - 3) Adhesive.
 - c. Legend:
 - 1) Letter height: 1/2 IN minimum.
 - 2) Equipment designation as indicated on the Drawings (e.g., "Primary Sludge Pump P-xxx").
- 6. Piping systems:
 - a. Tag type:
 - 1) Outdoor locations: Type G - Stenciling System.
 - 2) Indoor locations:
 - a) Type D - Self-Adhesive Tape Tags and Signs.
 - b) Type G - Stenciling System.
 - b. Fastener: Self.
 - c. Color: Per ASME A13.1.
 - d. Legend:

- 1) Letter height: Manufacturers standard for the pipe diameter.
 - 2) Mark piping in accordance with ASME A13.1.
 - 3) Use piping designation as indicated on the Drawings.
 - 4) Arrow: Single arrow.
7. Process tanks (over 1000 GAL) and basins, (e.g., chemical storage, clarifiers, trickling filters, digesters, etc):
- a. Tag type:
 - 1) Type B2 - Non-Metallic Signs.
 - 2) Type G - Stenciling System.
 - b. Fastener:
 - 1) Screw.
 - 2) Self.
 - c. Location as directed by Owner.
 - d. Legend:
 - 1) Letter height: 4 IN minimum.
 - 2) Equipment designation as indicated on the Drawings (e.g., "Clarifier CL-xxx").
8. Tanks (less than 1000 GAL) (e.g., break tanks, chemical tanks, hydro-pneumatic tanks, air receivers, etc.):
- a. Tag type:
 - 1) Type D - Self-Adhesive Tape Tags and Signs.
 - 2) Type G - Stenciling System.
 - b. Fastener: Self.
 - c. Legend:
 - 1) Letter height: 2 IN minimum.
 - 2) Equipment designation as indicated on the Drawings (e.g., "Polymer Storage Tank Txxx")
9. Equipment that starts automatically:
- a. Tag type:
 - 1) Type B2 - Non-Metallic Signs.
 - 2) Type D - Self-Adhesive Tape Tags and Signs.
 - b. Fastener:
 - 1) Type B2 - Screw or adhesive.
 - 2) Type D - Self.

- c. Size: 5 IN x 7 IN
- d. Location: {Equipment name}.
- e. Legend:
 - 1) OSHA Warning Sign.
 - 2) Description of Warning: "THIS MACHINE STARTS AUTOMATICALLY".

B. Instrumentation Systems:

- 1. Instrumentation Equipment (e.g., flow control valves, primary elements, etc.):
 - a. Tag type:
 - 1) Outdoor locations: Type B1 - Square Non-Metallic Tags.
 - 2) Indoor non-corrosive:
 - a) Type A1 - Round Metal Tags.
 - b) Type B1 - Square Non-Metallic Tags.
 - 3) Indoor corrosive:
 - a) Stainless steel Type A1 - Round Metal Tags.
 - b) Type B1 - Square Non-Metallic Tags.
 - b. Fastener:
 - 1) Type A1: Chain of the same material.
 - 2) Type B1: Stainless steel chain.
 - c. Legend:
 - 1) Letter height: 1/4 IN minimum.
 - 2) Equipment ISA designation as indicated on the Drawings (e.g., "FIT-xxx").
- 2. Enclosure for instrumentation and control equipment, (e.g., PLC control panels, etc.):
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/2 IN minimum.
 - 2) Equipment name (e.g., "PLC CONTROL PANEL PCP-xxx").
- 3. Components inside equipment enclosure, (e.g., PLC's, control relays, contactors, and timers):
 - a. Tag type: Type D - Self-Adhesive Tape Tags.

- b. Fastener: Self.
- c. Legend:
 - 1) Letter height: 3/16 IN minimum.
 - 2) Description or function of component (e.g., "PLC-xxx" or "CR-xxx").
- 4. Through enclosure door mounted components (e.g., selector switches, controller digital displays, etc.):
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/4 IN minimum.
 - 2) Component ISA tag number as indicated on the Drawings (e.g., "HS-xxx").
- C. HVAC Systems:
 - 1. General:
 - a. Provide arrows and markers on ducts.
 - 1) At 20 FT maximum centers along continuous lines.
 - 2) At changes in direction (route) or obstructions.
 - 3) At dampers, risers, branches, machinery or equipment.
 - a) Where ducts pass through floors, walls, ceilings, cladding assemblies and like obstructions provide markers on both sides.
 - b) Position markers on both sides of duct with arrow markers pointing in flow direction.
 - 4) If flow is in both directions use double headed arrow markers.
 - b. Apply tapes and stenciling in uniform manner parallel to ducts.
 - 2. HVAC Equipment (e.g., unit heaters, exhaust fans, air handlers, etc.):
 - a. Tag type:
 - 1) Type B2 - Non-Metallic Signs.
 - 2) Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1 IN minimum.
 - 2) Equipment designation as indicated on the Drawings (e.g., "EF-xxx").
 - 3. Ductwork:
 - a. Tag type:

- 1) Type D - Self-Adhesive Tape Tags and Signs.
- 2) Type G - Stenciling System.
 - a) Fastener: Self.
 - b) Legend:
- 3) Letter height: 1 IN minimum.
- 4) Description of ductwork, (e.g., "AIR SUPPLY").
- 5) Arrows: Single arrow.
4. Enclosure for instrumentation and control equipment, (e.g., fan control panels, etc.):
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/2 IN minimum.
 - 2) Equipment designation as indicated on the Drawings (e.g., "FAN CONTROL PANEL FCP-xxx").
5. Wall mounted thermostats:
 - a. Tag type: Type D - Self-Adhesive Tape Tags and Signs.
 - b. Fastener: Self.
 - c. Legend:
 - 1) Letter height: 3/16 IN minimum.
 - 2) Description of equipment controlled (e.g., "UH-xxx" or AHU-xxx").
6. Components inside equipment enclosure, (e.g., controller's, control relays, contactors, and timers):
 - a. Tag type: Type D - Self-Adhesive Tape Tags and Signs.
 - b. Fastener: Self.
 - c. Legend:
 - 1) Letter height: 3/16 IN minimum.
 - 2) Description or function of component (e.g., "CR-xxx").
7. Through enclosure door mounted equipment (e.g., selector switches, controller digital displays, etc.):
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/4 IN minimum.

- 2) Component tag number as indicated on the Drawings or as defined by contractor (e.g., "HS-xxx").

D. Electrical Systems:

1. Trenches with ductbanks, direct-buried conduit, or direct-buried wire and cable.
 - a. Tag type: Type F - Underground Warning Tape.
 - b. Letter height: 1-1/4 IN minimum.
 - c. Location:
 - 1) Where trench is 12 IN or more below finished grade: In trench 6 IN below finished grade.
 - 2) Where trench is less than 12 IN below finished grade: In trench 3 IN below finished grade.
 - d. Electrical power (e.g., low and medium voltage):
 - 1) Color: Red with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION".
 - b) Second line: "BURIED ELECTRIC LINE BELOW".
 - e. Communications (e.g., telephone, instrumentation, LAN, SCADA):
 - 1) Color: Orange with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION".
 - b) Second line: "BURIED COMMUNICATION LINE BELOW".
2. Exposed conduit, and flexible connections.
 - a. Tag type: Type A2 – Stainless Steel.
 - b. Letter height: 1/4 IN minimum.
 - c. Locations, including but not limited to:
 - 1) Where indicated on the drawings.
 - 2) Where conduits rise below finished grade.
 - 3) Where conduits pass through walls, underground pull boxes or enter enclosures.
3. Switchgear, switchboards and motor control centers:
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.

- c. Main equipment legend:
 - 1) Letter height:
 - a) First line: 1 IN minimum.
 - b) Subsequent lines: 3/8 IN minimum.
 - 2) First line: Equipment name (e.g., "MAIN SWITCHBOARD MSBxxx").
 - 3) Second line:
 - a) Source of power (e.g., "FED FROM MCCxxx LOCATED IN ROOM xxx").
 - b) The source of power room number is only required when there are multiple electrical rooms, if the source is in another building, the building name or number shall be used.
 - 4) Third line: System voltage and phase (e.g., "480/277 V, 3PH").
 - 5) Main and feeder device legend:
 - a) Letter height: 3/8 IN minimum.
 - b) Description of load (e.g., "MAIN DISCONNECT", "PUMP Pxxx" or "PANELBOARD HPxxx").
- 4. Panelboards and transformers:
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height:
 - a) First line: 3/8 IN minimum.
 - b) Subsequent lines: 3/16 IN minimum.
 - 2) First line: Equipment name (e.g., "PANELBOARD LPxxx" or "TRANSFORMER Txxx").
 - 3) Second line (panelboards only): System voltage and phase (e.g., "208/120V, 3PH").
- 5. Transfer switches:
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height:
 - a) First line: 3/8 IN minimum.
 - b) Subsequent lines: 3/16 IN minimum.

- 2) First line: Equipment name (e.g., "AUTOMATIC TRANSFER SWITCH ATSxxx").
6. Safety switches, separately mounted circuit breakers and motor starters, VFD's, etc.:
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/4 IN minimum.
 - 2) First line: Description of load equipment is connected to (e.g., "PUMP Pxxx").
7. Enclosure for instrumentation and control equipment, (e.g., lighting control panels, etc.):
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/2 IN minimum.
 - 2) Equipment name (e.g., "LIGHTING CONTROL PANEL LCPxxx").
 - d. Provide the following diagrams and tables on the inside door of each MCC/Panel/Cabinet Compartment:
 - 1) Elementary wiring diagram (laminated, clean, and legible).
 - 2) If, after a reasonable effort, the factory panel and design will not accommodate the laminated diagram, attached to the door, it may be placed in a document pouch designed into the panel for this purpose.
 - 3) Table of Overload Heater elements/settings with the correct settings highlighted.
 - 4) Table of motor circuit protector/breaker settings with the correct settings highlighted.
 - e. All components inside MCC/panels/cabinet compartments to be clearly labeled and identified with permanent, laminated or plastic phenolic identification tag/label. Tags/Labels to be neatly (square.plumb, level) and securely installed on the back plate. All components (i.e. All relays, terminal blocks, transformers, fuse blocks, modules, rectifiers, auxillary/accessory devices, etc.) to be tagged/labeled/identified to correspond to the applicable letters/numbers used on the terminal blocks or wiring diagrams.
 - f. All devices mounted to MCC/panel/cabinet compartment doors to be labeled outside doors as follows:

- 1) Engrave stock, melamine plastic laminate, 1/16-inch thick for signs up to 20-sq inches. (129 sq. cm) 1/8-inch (3.2 mm) thick for larger sizes.
 - a) Engraved Legend: Black Letters on white face.
 - b) Punch for mechanical fasteners,
- 2) Fasteners for Plastic laminated and Metal Signs: Self tapping 316-SS screws or No. 4/40 316-SS machine screws. Tap and thread as needed for U.S.E. 316-SS flat nuts.
8. Components inside equipment enclosures (e.g., circuit breakers, fuses, control power transformers, control relays, contactors, timers, etc.):
 - a. Tag type: Type D - Self-Adhesive Tape Tags and Signs.
 - b. Fastener: Self.
 - c. Legend:
 - 1) Letter height: 3/16 IN minimum.
 - 2) Description or function of component (e.g., "M-xxx", "CR-xxx" or "TR-xxx").
9. Through enclosure door mounted equipment (e.g., selector switches, controller digital displays, etc.):
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/4 IN minimum.
 - 2) Component tag number as indicated on the Drawings or as defined by contractor (e.g., "HS-xxx").
 - d. All devices mounted to MCC/panel/cabinet compartment doors to be labeled inside doors as follows
 - 1) Use self-stick labels as manufactured by Brady or pre-approved equal.
 - 2) Secure label above each device so as wiring of device will not interfere with reading of label.
 - 3) Nomenclature on label shall match tag on outside of door (i.e. HAND OFF AUTO, RUN, RESET, ALARM, etc. along with corresponding Pump/Equipment No.).
10. Conductors in control panels and in pull or junction boxes where multiple circuits exist.
 - a. Tag type: Type D - Self-Adhesive Tape Tags.
 - b. Fastener: Self.
 - c. Tag conductor at both ends.

- d. Legend:
 - 1) Letter height: 1/8 IN minimum.
 - 2) Circuit number or wire number as scheduled on the Drawings or as furnished with the equipment.
- 11. Conductors in cable trays.
 - a. Tag type: Type D - Self-Adhesive Tape Tags.
 - b. Fastener: Self.
 - c. Tag all conductors at the same location in the tray at 50FT maximum intervals.
 - d. Legend:
 - 1) Letter height: 1/8 IN minimum.
 - 2) Circuit number or wire number as scheduled on the Drawings.
- 12. Grounding conductors associated with grounding electrode system in accordance with the following:
 - a. Tag type: Type D - Self-Adhesive Tape Tags.
 - b. Fastener: Self.
 - c. Legend:
 - 1) Letter height: 1/8 IN minimum.
 - 2) Function of conductor (e.g., "MAIN BONDING JUMPER", "TO GROUND RING", "TO MAIN WATER PIPE").
- 13. Flash protection for switchboards, panelboards, industrial control panels and motor control centers:
 - a. Tag type: Type D - Self-Adhesive Tape Signs.
 - b. Fastener: Self.
 - c. Legend: Per NFPA 70.
- 14. Entrances to electrical rooms:
 - a. Tag type: Type B2 - Non-Metallic Signs.
 - b. Fastener: Screw or adhesive.
 - c. Size: 5 IN x 7 IN.
 - d. Location: Each door to room.
 - e. Legend:
 - 1) OSHA Danger Sign.
 - 2) Description of Danger: "HIGH VOLTAGE, AUTHORIZED PERSONNEL ONLY".
- 15. Equipment where more than one (1) voltage source is present:

- a. Tag type:
 - 1) Type B2 - Non-Metallic Signs.
 - 2) Type D - Self-Adhesive Tape Signs.
- b. Fastener:
 - 1) Screw or adhesive.
 - 2) Self.
- c. Size: 1-3/4 IN x 2-1/2 IN.
- d. Location: Exterior face of enclosure or cubical.
- e. Legend:
 - 1) OSHA Danger Sign.
 - 2) Description of Danger: "MULTIPLE VOLTAGE SOURCES".

3.3 HAZARD AND SAFETY SIGNS

- A. Provide: Hazard and Safety Signs:
 - 1. Type {B2} {D}.
- B. Inscription as indicated on drawings and accepted by Owner.

3.4 OWNER TRAINING (NOT USED)

END OF SECTION

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SECTION 26 05 00

ELECTRICAL BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Basic requirements for electrical systems.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.
3. Section 10 14 00 – Identification Devices.
4. Division 26 – Electrical.
5. Section 26 05 19 – Wire and Cable - 600 Volt and Below.
6. Section 26 05 33 – Raceways and Boxes.

1.2 MEASUREMENT AND PAYMENT

A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

B. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.3 QUALITY ASSURANCE

A. Referenced Standards:

1. Aluminum Association (AA).
2. American Iron and Steel Institute (AISI).
3. ASTM International (ASTM):
 - a. A123 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - b. A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
4. ETL Testing Laboratories (ETL).
5. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - a. C2 – National Electrical Safety Code (NESC).
6. National Electrical Manufacturers Association (NEMA):
 - a. 250 – Enclosures for Electrical Equipment (1000 Volts Maximum).

7. National Fire Protection Association (NFPA):
 - a. 70 – National Electrical Code (NEC).
8. Underwriters Laboratories, Inc. (UL).
- B. Where Underwriters Laboratories, Inc. (UL) test procedures have been established for the product type, use UL or ETL Testing Laboratories (ETL) approved electrical equipment and provide with the UL or ETL label.

1.4 DEFINITIONS

- A. For the purposes of providing materials and installing electrical work the following definitions shall be used.
 1. Outdoor area: Exterior locations where the equipment is normally exposed to the weather and including below grade structures, such as vaults, manholes, handholes and in-ground pump stations.
 2. Architecturally finished interior area: Offices, laboratories, conference rooms, restrooms, corridors and other similar occupied spaces.
 3. Non-architecturally finished interior area: Pump, chemical, mechanical, electrical rooms and other similar process type rooms.
 4. Highly corrosive and corrosive area: Areas identified on the Drawings where there is a varying degree of spillage or splashing of corrosive materials such as water, wastewater or chemical solutions; or chronic exposure to corrosive, caustic or acidic agents, chemicals, chemical fumes or chemical mixtures.
 5. Hazardous areas: Class I, II or III areas as defined in NFPA 70 (NEC).
 6. Shop fabricated: Manufactured or assembled equipment for which a UL test procedure has not been established.

1.5 SUBMITTALS

- A. Shop Drawings:
 1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of submittal process.
 2. See Specification Section 40 05 05 – Equipment: Basic Requirements and individual specification sections for submittal requirements for products defined as equipment. – *Not Applicable for this project*
 3. General requirements:
 - a. Provide manufacturer's technical information on products to be used, including product descriptive bulletin.
 - b. Include data sheets that include manufacturer's name and product model number.
 - 1) Clearly identify all optional accessories.

- c. Acknowledgement that products are UL or ETL listed or are constructed utilizing UL or ETL recognized components.
 - d. Manufacturer's delivery, storage, handling and installation instructions.
 - e. Product installation details.
 - f. See individual specification sections for any additional requirements.
- B. Operation and Maintenance Manuals:
 - 1. See Specification Section 01 33 00 – Submittals and Specification Section 01 78 23.13 – Operation and Maintenance Data for requirements for:
 - a. The mechanics and administration of the submittal process.
 - b. The content process of Operation and Maintenance Manuals.
- C. When a Specification Section includes products specified in another Specification Section, each Specification Section shall have the required Shop Drawing transmittal form per Specification Section 01 33 00 – Submittals and all Specification Sections shall be submitted simultaneously.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. See Specification Section 01 65 50 – Product Delivery, Storage, and Handling.
- B. Protect nameplates on electrical equipment to prevent defacing.

1.7 AREA DESIGNATIONS

- A. Designation of an area will determine the NEMA rating of the electrical equipment enclosures, types of conduits and installation methods to be used in that area.
 - 1. Outdoor areas:
 - a. Wet.
 - b. Also, corrosive and/or hazardous when specifically designated on the Drawings or in the Specifications.
 - 2. Indoor areas:
 - a. Dry.
 - b. Also, wet, corrosive and/or hazardous when specifically designated on the Drawings or in the Specifications.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, refer to specific Division 26 – Electrical Specification Sections and specific material paragraphs below for acceptable manufacturers.

- B. Submit request for substitution in accordance with Specification Section 01 25 13 – Product Substitutions.
- C. Provide all components of a similar type by one (1) manufacturer.

2.2 MATERIALS

- A. Electrical Equipment Support Pedestals and/or Racks:
 - 1. Approved manufacturers:
 - a. Modular strut:
 - 1) Unistrut Building Systems.
 - 2) B-Line.
 - 3) Globe Strut.
 - 2. Material requirements:
 - a. Modular strut:
 - 1) Galvanized steel: ASTM A123 or ASTM A153.
 - 2) Stainless steel: AISI Type 316.
 - 3) PVC coated galvanized steel: ASTM A123 or ASTM A153 and 20 mil PVC coating.
 - 4) Aluminum: AA Type 6063-T6.
 - b. Strut and mounting hardware:
 - 1) Hot-Dip Galvanized Steel to be used for indoor dry locations only.
 - 2) Type 316 Stainless Steel to be used for all locations except indoor dry locations.
 - c. Anchorage per Specification Section 05 50 00 – Not Applicable for this project
- B. Field touch-up of galvanized surfaces.
 - 1. Zinc-rich primer.
 - a. One (1) coat, 3.0 mils, ZRC by ZRC Products.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install and wire all equipment, including prepurchased equipment, and perform all tests necessary to assure conformance to the Drawings and Specification Sections and ensure that equipment is ready and safe for energization.
- B. Install equipment in accordance with the requirements of:
 - 1. NFPA 70 (NEC).

2. IEEE C2.
3. The manufacturer's instructions.
- C. In general, conduit routing is not shown on the Drawings.
 1. The Contractor is responsible for routing all conduits including those shown on one-line and control block diagrams and home runs shown on floor plans.
 2. Conduit routings and stub-up locations that are shown are approximate; exact routing to be as required for equipment furnished and field conditions.
- D. When complete branch circuiting is not shown on the Drawings:
 1. A homerun indicating panelboard name and circuit number will be shown and the circuit number will be shown adjacent to the additional devices (e.g., light fixture and receptacles) on the same circuit.
 2. The Contractor is to furnish and install all conduit and conductors required for proper operation of the circuit.
 3. The indicated home run conduit and conductor size shall be used for the entire branch circuit.
 4. See Specification Section 26 05 19 – Wire and Cable - 600 Volt and Below for combining multiple branch circuits in a common conduit.
- E. Do not use equipment that exceed dimensions or reduce clearances indicated on the Drawings or as required by the NFPA 70 (NEC).
- F. Install equipment plumb, square and true with construction features and securely fastened.
- G. Install electrical equipment, including pull and junction boxes, minimum of 6 IN from process, gas, air and water piping and equipment.
- H. Install equipment so it is readily accessible for operation and maintenance, is not blocked or concealed and does not interfere with normal operating and maintenance requirements of other equipment.
- I. Device Mounting Schedule:
 1. Unless indicated otherwise on the Drawings, mounting heights are as indicated below:
 - a. Light switch (to center): 48 IN.
 - b. Receptacle in architecturally finished areas (to center): 18 IN.
 - c. Receptacle on exterior wall of building (to center): 18 IN.
 - d. Receptacle in non-architecturally finished areas (to center): 48 IN.
 - e. Telephone outlet in architecturally finished areas (to center): 18 IN.
 - f. Telephone outlet for wall-mounted phone (to center): 54 IN.
 - g. Safety switch (to center of operating handle): 54 IN.

- h. Separately mounted motor starter (to center of operating handle): 54 IN.
 - i. Pushbutton or selector switch control station (to center): 48 IN.
 - j. Panelboard (to top): 72 IN.
- J. Avoid interference of electrical equipment operation and maintenance with structural members, building features and equipment of other trades.
 - 1. When it is necessary to adjust the intended location of electrical equipment, unless specifically dimensioned or detailed, the Contractor may make adjustments according to NEC requirements for working clearances and in coordination with the Owner's representative.
- K. Provide electrical equipment support systems per the following area designations:
 - 1. Dry areas:
 - a. Galvanized system consisting of hot dip galvanized steel channels and fittings, nuts and hardware.
 - b. Aluminum system consisting of aluminum channels and fittings with Type 316 stainless steel nuts and hardware.
 - 2. Outdoor and Wet areas:
 - a. Type 316 Stainless Steel system consisting of Type 316 stainless steel channels and fittings, nuts and hardware.
 - 3. Corrosive areas Indoor and Outdoors:
 - a. Stainless steel system consisting of stainless steel channels and fittings, nuts and hardware. All components to be Type 316.
- L. Provide all necessary anchoring devices and supports rated for the equipment load based on dimensions and weights verified from approved submittals, or as recommended by the manufacturer.
 - 1. Do not cut, or weld to, building structural members.
 - 2. Do not mount safety switches or other equipment to equipment enclosures, unless enclosure mounting surface is properly braced to accept mounting of external equipment.
- M. Provide corrosion resistant spacers to maintain 1/4 IN separation between metallic equipment and/or metallic equipment supports and mounting surface in wet areas, on below grade walls and on walls of liquid containment or processing areas such as Basins, Clarifiers, Digesters, Reservoirs, etc.
- N. Do not place equipment fabricated from aluminum in direct contact with earth or concrete.
- O. Screen or seal all openings into equipment mounted outdoors to prevent the entrance of rodents and insects.

- P. Do not use materials that may cause the walls or roof of a building to discolor or rust.
- Q. Identify electrical equipment and components in accordance with Specification Section 10 14 00 – Identification Devices.

3.2 FIELD QUALITY CONTROL

- A. Verify exact rough-in location and dimensions for connection to electrified equipment, provided by others.
 - 1. See Specification Section 01 73 20 – Openings and Penetrations for openings and penetrations in structures.
- B. Replace equipment and systems found inoperative or defective and re-test.
- C. Cleaning:
 - 1. See Specification Section 01 74 13 – Cleaning.
- D. The protective coating integrity of support structures and equipment enclosures shall be maintained.
 - 1. Repair galvanized components utilizing a zinc rich paint.
 - 2. Repair painted components utilizing touch up paint provided by or approved by the manufacturer.
 - 3. Repair surfaces which will be inaccessible after installation prior to installation.
 - 4. See Specification Section 26 05 33 – Raceways and Boxes for requirements for conduits and associated accessories.
- E. Replace nameplates damaged during installation.

3.3 DEMONSTRATION

- A. Demonstrate equipment in accordance with Specification Section 01 75 00 – Facility Start Up.

END OF SECTION

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SECTION 26 05 19

WIRE AND CABLE 600 VOLT AND BELOW

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Material and installation requirements for:

- a. Building wire.
- b. Power cable.
- c. Control cable.
- d. Instrumentation cable.
- e. Wire connectors.
- f. Insulating tape.
- g. Pulling lubricant.

B. Related Specification Sections include but are not necessarily limited to:

- 1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
- 2. Division 01 – General Requirements.
- 3. Section 26 05 00 – Electrical Basic Requirements.

1.2 MEASUREMENT AND PAYMENT

A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

B. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.3 QUALITY ASSURANCE

A. Referenced Standards:

- 1. Canadian Standards Association (CSA):
 - a. Test Methods for Electrical Wires and Cables (FT-4 Vertical Cable Tray Test).
- 2. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - a. 1202 – Standard for Flame-Propagation Testing of Wire and Cable.
- 3. National Electrical Manufacturers Association (NEMA):
 - a. ICS 4 – Industrial Control and Systems: Terminal Blocks.

4. National Electrical Manufacturers Association/Insulated Cable Engineers Association (NEMA/ICEA):
 - a. WC 57/S-73-532 – Standard for Control Cables.
 - b. WC 70/S-95-658 – Non-Shielded Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.
5. National Fire Protection Association (NFPA):
 - a. 70 – National Electrical Code (NEC).
6. Underwriters Laboratories, Inc. (UL):
 - a. 13 – Standard for Safety Power-Limited Circuit Cables.
 - b. 44 – Standard for Safety Thermoset-Insulated Wires and Cables.
 - c. 83 – Standard for Safety Thermoplastic-Insulated Wires and Cables.
 - d. 467 – Standard for Safety Grounding and Bonding Equipment.
 - e. 486A – Standard for Safety Wire Connectors and Soldering Lugs for use with Copper Conductors.
 - f. 486C – Standard for Safety Splicing Wire Connections.
 - g. 510 – Standard for Safety Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape.
 - h. 1277 – Standard for Safety Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.
 - i. 1569 – Standard for Safety Metal-Clad Cables.
 - j. 1581 – Standard for Safety Reference Standard for Electrical Wires, Cables, and Flexible Cords.
 - k. 1666 – Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts.
 - l. 2225 – Cables and Cable Fittings for Use in Hazardous (Classified) Locations.
 - m. 2250 – Standard for Safety Instrumentation Tray Cable.

1.4 DEFINITIONS

- A. Cable: Multi-conductor, insulated, with outer sheath containing either building wire or instrumentation wire.
- B. Instrumentation Cable:
 1. Multiple conductor, insulated, twisted or untwisted, with outer sheath.
 2. The following are specific types of instrumentation cables:
 - a. Analog signal cable:

- 1) Used for the transmission of low current (e.g., 4-20mA DC) or low voltage (e.g., 0-10 Vdc) signals, using No. 16 AWG and smaller conductors.
- 2) Commonly used types are defined in the following:
 - a) TSP: Twisted shielded pair.
 - b) TST: Twisted shielded triad.
- b. Digital signal cable: Used for the transmission of digital signals between computers, PLC's, RTU's, etc.
- C. Power Cable: Multi-conductor, insulated, with outer sheath containing building wire, No. 8 AWG and larger.
- D. Control Cable: Multi-conductor, insulated, with outer sheath containing building wires, No. 14, No. 12 or No. 10 AWG.
- E. Building Wire: Single conductor, insulated, with or without outer jacket depending upon type.

1.5 SUBMITTALS

- A. Shop Drawings:
 1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
 1. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
 - 1) Wire connectors.
 - 2) Insulating tape.
 - 3) Cable lubricant.
 - b. See Specification Section 26 05 00 for additional requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. See Specification Section 26 05 00 – Electrical Basic Requirements.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 1. Building wire, power, control cable and multiplex cable:
 - a. American Insulated Wire Corporation.
 - b. General Cable.

- c. Manhattan/CDT.
 - d. Southwire Company.
 - 2. Instrumentation cable:
 - a. Analog cable:
 - 1) Alpha Wire Corporation.
 - 2) American Insulated Wire Corporation.
 - 3) Belden CDT Inc.
 - 4) General Cable.
 - 5) Manhattan/CDT.
 - 3. Wire connectors:
 - a. Buchanan.
 - b. Ideal.
 - c. 3M Co.
 - 4. Insulating and color coding tape:
 - a. 3M Co. $\frac{3}{4}$ " wide
- B. Submit request for substitution in accordance with Specification Section 01 25 13 – Product Substitutions.

2.2 MANUFACTURED UNITS

- A. Building Wire:
- 1. Conductor shall be copper with 600 V rated insulation.
 - 2. Conductors shall be stranded.
 - 3. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
 - 4. Conform to NEMA/ICEA WC 70/S-95-658 and UL 83 for THHN/THWN-2 insulation.
- B. Power Cable:
- 1. Conductor shall be copper with 600 V rated THHN/THWN-2 insulation.
 - 2. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
 - 3. Conform to NEMA/ICEA WC 70/S-95-658 and UL 83 for type THHN/THWN-2 insulation.
 - 4. Number of conductors as required, including a bare ground conductor.
 - 5. Individual conductor color coding:
 - a. ICEA Method 4.

b. See PART 3 of this Specification Section for additional requirements.

6. Conform to NFPA 70 Type TC and IEEE 1202.

C. Control Cable:

1. Conductor shall be copper with 600 V rated.
2. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
3. Conform to NEMA/ICEA WC 57/S-73-532 and UL 83 and UL 1277 for type THHN/THWN insulation with an overall PVC jacket.
4. Number of conductors as required, provided with or without bare ground conductor of the same AWG size.

a. When a bare ground conductor is not provided, an additional insulated conductor shall be provided and used as the ground conductor (e.g., 6/c No. 14 w/g and 7/c No. 14 or equal).

5. Individual conductor color coding:

a. NEMA/ICEA Method 1, Table E-2.

b. See PART 3 of this Specification Section for additional requirements.

6. Conform to NFPA 70 Type TC and IEEE 1202, NFPA 262.

D. Electrical Equipment Control Wire:

1. Conductor shall be copper with 600 V rated insulation.
2. Conductors shall be stranded.
3. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
4. Conform to UL 44 for Type SIS insulation.
5. Conform to UL 83 for Type MTW insulation.

E. Instrumentation Cable:

1. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
2. Analog cable:
 - a. Tinned copper conductors.
 - b. 600 V PVC insulation with PVC jacket.
 - c. Twisted with 100 percent foil shield coverage with drain wire.
 - d. Six (6) twists per foot minimum.
 - e. Individual conductor color coding: ICEA Method 1, Table K-2.
 - f. Conform to IEEE 1202, NFPA 262, UL 2250, UL 1581 and NFPA 70 Type ITC.

3. Digital cable:
 - a. As recommended by equipment (e.g., PLC, RTU) manufacturer.
 - b. Horizontal voice and data cable:
 - 1) Category 6 per TIA/EIA/ANSI 568.
 - 2) Cable shall be label-verified.
 - 3) Cable jacket shall be factory marked at regular intervals indicating verifying organization and performance level.
 - 4) Conductors: No. 24 AWG solid untinned copper.
 - 5) Rated CMP per NFPA 70.

F. Wire Connectors:

1. Twist/screw on type:
 - a. Insulated pressure or spring type solderless connector.
 - b. 600 V rated.
 - c. Ground conductors: Conform to UL 486C and/or UL 467 when required by local codes.
 - d. Phase and neutral conductors: Conform to UL 486C.
2. Compression and mechanical screw type:
 - a. 600 V rated.
 - b. Ground conductors: Conform to UL 467.
 - c. Phase and neutral conductors: Conform to UL 486A.
3. Terminal block type:
 - a. High density, screw-post barrier-type with white center marker strip.
 - b. 600 V and ampere rating as required, for power circuits.
 - c. 600 V, 20 ampere rated for control circuits.
 - d. 300 V, 15 ampere rated for instrumentation circuits.
 - e. Conform to NEMA ICS 4 and UL 486A.

G. Insulating and Color Coding Tape:

1. Pressure sensitive vinyl.
2. Premium grade.
3. Heat, cold, moisture, and sunlight resistant.
4. Thickness, depending on use conditions: 7, 8.5, or 10 mil.
5. For cold weather or outdoor location, tape must also be all-weather.
6. Color:

- a. Insulating tape: Black.
- b. Color coding tape: Fade-resistant color as specified herein.
- 7. Comply with UL 510.
- H. Pulling Lubricant: Cable manufacturer's standard containing no petroleum or other products which will deteriorate insulation.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Permitted Usage of Insulation Types:
 - 1. Type THHN/THWN and THHN/THWN-2:
 - a. Use for general wiring applications. No. 12 AWG is the smallest size to be used for power wiring. No. 14 is the smallest size to be used for control wiring.
 - 2. Type MTW:
 - a. For the wiring of control equipment within control panels and field wiring of control equipment within switchgear, switchboards, motor control centers.
- B. Conductor Size Limitations:
 - 1. Feeder and branch power conductors shall not be smaller than No. 12 AWG unless otherwise indicated on the Drawings.
 - 2. Control conductors shall not be smaller than No. 14 AWG unless otherwise indicated on the Drawings.
 - 3. Instrumentation conductors shall not be smaller than No. 18 AWG unless otherwise indicated on the Drawings.
- C. Color Code All Wiring as Follows:
 - 1. Building wire:
 - a. Wire Insulation Colors
 - 1) 480 Volt Three Phase Systems
 - a) A Phase - Brown
 - b) B Phase - Purple
 - c) C Phase - Yellow
 - d) Neutral - Grey
 - e) Ground - Green

- 2) 240 Volt Single Phase Systems
 - a) Line 1 - Black
 - b) Line 2 - Red
 - c) Neutral - White
 - d) Ground - Green
- b. All conductors shall be identified by a continuously colored outer finish along its entire length. The use of colored tape to identify conductors is not acceptable.
2. Power cables ICEA Method 4 with:
 - a. Phase and neutral conductors identified with 3 IN of colored tape, per the above listed insulation colors, applied at the terminations.
 - b. Ground conductor: Bare.
3. Control cables NEMA/ICEA Method 1, Table E-2:
 - a. When a bare ground is not provided, one (1) of the colored insulated conductors shall be re-identified by stripping the insulation from the entire exposed length or using green tape to cover the entire exposed length.
 - b. When used in power applications the colored insulated conductors used as phase and neutral conductors may have to be re-identified with 3 IN of colored tape, per the Table herein, applied at the terminations.
- D. Install all wiring in raceway unless otherwise indicated on the Drawings.
- E. Feeder, branch, control and instrumentation circuits shall not be combined in a raceway, cable tray, junction or pull box, except as permitted in the following:
 1. Where specifically indicated on the Drawings.
 2. Where field conditions dictate and written permission is obtained from the Owner's representative.
 3. Control circuits shall be isolated from feeder and branch power and instrumentation circuits, but combining of control circuits is permitted.
 - a. The combinations shall comply with the following:
 - 1) 12 Vdc, 24 Vdc and 48 Vdc may be combined.
 - 2) 125 Vdc shall be isolated from all other AC and DC circuits.
 - 3) AC control circuits shall be isolated from all DC circuits.
 4. Instrumentation circuits shall be isolated from feeder and branch power and control circuits but combining of instrumentation circuits is permitted.
 - a. The combinations shall comply with the following:
 - 1) Analog signal circuits may be combined.

- 2) Digital signal circuits may be combined but isolated from analog signal circuits.
5. Multiple branch circuits for lighting, receptacle and other 120 Vac circuits are allowed to be combined into a common raceway.
 - a. Contractor is responsible for making the required adjustments in conductor and raceway size, in accordance with all requirements of the NEC, including but not limited to:
 - 1) Up sizing conductor size for required ampacity de-ratings for the number of current carrying conductors in the raceway.
 - 2) Up sizing raceway size for the size and quantity of conductors.
- F. Ground the drain wire of shielded instrumentation cables at one (1) end only.
 1. The preferred grounding location is at the control panel, not at the field mounted instrument.
 2. Grounded end at drain cable to be of sufficient length to reach ground screw or terminal strip. Insulate with heat shrink. No daisy chain of grounds
- G. Splices and terminations for the following circuit types shall be made in the indicated enclosure type using the indicated method.
 1. Feeder and branch power circuits:
 - a. Device outlet boxes:
 - 1) Twist/screw not approved.
 - b. Junction and pull boxes and wireways:
 - 1) Twist/screw on type connectors for use on No. 10 and smaller wire.
 - 2) Compression, terminal block or terminal strip type connectors for use on all wire sizes.
 - c. Motor terminal boxes:
 - 1) Twist/screw not approved.
 - 2) Compression, terminal block or insulated multi-tap screw type connectors for use on all wire sizes.
 2. Control circuits:
 - a. Junction and pull boxes: Terminal block type connector.
 - b. Manholes or handholes: Insulated multi-tap screw type connectors pre-filled with De-ox.
 - c. Control panels and motor control centers: Terminal block or strips provided within the equipment or field installed within the equipment by the Contractor.
 3. Instrumentation circuits can be spliced where field conditions dictate and written permission is obtained from the Owner's representative.

- a. Maintain electrical continuity of the shield when splicing twisted shielded conductors.
 - b. Junction and pull boxes: Terminal block type connector.
 - c. Control panels and motor control centers: Terminal block or strip provided within the equipment or field installed within the equipment by the Contractor.
4. Non-insulated compression and mechanical screw type connectors shall be insulated with tape or hot or cold shrink type insulation to the insulation level of the conductors.
- H. Insulating Tape Usage:
1. For insulating connections of No. 8 AWG wire and smaller: 7 mil vinyl tape.
 2. For insulating splices and taps of No. 6 AWG wire or larger: 10 mil vinyl tape.
 3. For insulating connections made in cold weather or in outdoor locations: 8.5 mil, all weather vinyl tape.
- I. Color Coding Tape Usage: For color coding of conductors.

3.2 FIELD QUALITY CONTROL

A. Megger Testing

1. Megger test conductors No. 8 AWG and larger which are energized at 480 volts. Record megger tests on a test sheet and provide test sheets to SJRA in the form of a submittal. Include circuit designation, date, time, temperature, weather conditions and megohm readings on the test sheet.

END OF SECTION

SECTION 26 05 26

GROUNDING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Material and installation requirements for grounding systems.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.
3. Section 10 14 00 – Identification Devices.
4. Section 26 05 00 – Electrical: Basic Requirements.
5. Section 26 05 19 – Wire and Cable - 600 Volt and Below.
6. Section 26 05 33 – Raceways and Boxes.

1.2 MEASUREMENT AND PAYMENT

A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

B. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.3 QUALITY ASSURANCE

A. Referenced Standards:

1. ASTM International (ASTM):
 - a. B8 – Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
2. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - a. 837 – Standard for Qualifying Permanent Connections Used in Substation Grounding.
3. National Fire Protection Association (NFPA):
 - a. 70 – National Electrical Code (NEC).
 - 1) Article 250 – Grounding and Bonding.
4. Underwriters Laboratories, Inc. (UL):
 - a. 467 – Grounding and Bonding Equipment.

B. Assure ground continuity is continuous throughout the entire Project.

1.4 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
2. Product technical data.
 - a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
 - 1) Grounding clamps, terminals and connectors.
 - 2) Exothermic welding system.
 - b. See Specification Section 26 05 00 for additional requirements.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- #### **A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:**
1. Ground rods and bars and grounding clamps, connectors and terminals:
 - a. Burndy.
 - b. Joslyn.
 - c. Thomas & Betts (Blackburn).
 2. Exothermic weld connections:
 - a. Erico Products Inc., Cadweld.
 - b. Harger Lightning Protection.
 - c. Thermoweld.
 3. Prefabricated composite test stations:
 - a. Oldcastle
- #### **B. Submit request for substitution in accordance with Specification Section 01 25 13 – Product Substitutions.**

2.2 COMPONENTS

A. Wire and Cable:

1. Bare conductors: Soft drawn stranded copper meeting ASTM B8.
2. Insulated conductors: Color coded green, per Specification Section 26 05 19 – Wire and Cable - 600 Volt and Below.

- #### **B. Conduit: As specified in Specification Section 26 05 33 – Raceways and Boxes.**

C. Ground Bars:

1. Solid copper:
 - a. 1/4 INCH thick.
 - b. 2 or 4 INCH wide.
 - c. 24 INCH long minimum in main service entrance electrical rooms, 12 INCH long elsewhere.
2. Predrilled grounding lug mounting holes.
3. Stainless steel or galvanized steel mounting brackets.
4. Insulated standoffs.

D. Ground Rods:

1. 3/4 INCH x 20 FT minimum.
2. Copperclad:
 - a. Heavy uniform coating of electrolytic copper molecularly bonded to a rigid steel core.
 - b. Corrosion resistant bond between the copper and steel.
 - c. Hard drawn for a scar-resistant surface.

E. Grounding Clamps, Connectors and Terminals:

1. Mechanical type:
 - a. Standards: UL 467.
 - b. High copper alloy content.
2. Compression type for interior locations:
 - a. Standards: UL 467.
 - b. High copper alloy content.
 - c. Non-reversible.
 - d. Terminals for connection to bus bars shall have two bolt holes.
3. Compression type suitable for direct burial in earth or concrete:
 - a. Standards: UL 467, IEEE 837.
 - b. High copper alloy content.
 - c. Non-reversible.

F. Exothermic Weld Connections:

1. Copper oxide reduction by aluminum process.
2. Molds properly sized for each application.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Install products in accordance with manufacturer's instructions.
2. Size grounding conductors and bonding jumpers in accordance with NFPA 70 Article 250, except where larger sizes are indicated on the Drawings.
3. Remove paint, rust, or other non-conducting material from contact surfaces before making ground connections.
4. Where ground conductors pass through floor slabs or building walls provide non-metallic sleeves and install per Specification Section 01 73 20 – Openings and Penetrations.
5. Do not splice grounding conductors except at ground rods.
6. Install ground rods and grounding conductors in undisturbed, firm soil.
 - a. Provide excavation required for installation of ground rods and ground conductors.
 - b. Use driving studs or other suitable means to prevent damage to threaded ends of sectional rods.
 - c. Unless otherwise specified, connect conductors to ground rods with compressor type connectors. Test before energize.
 - d. Provide sufficient slack in grounding conductor to prevent conductor breakage during backfill or due to ground movement.
 - e. Backfill excavation completely, thoroughly tamping to provide good contact between backfill materials and ground rods and conductors.
 - f. If the tested resistance of a ground rod exceeds 25 ohms, install a second ground rod at the tested location.
7. Do not use exothermic welding if it will damage the structure the grounding conductor is being welded to.

B. Grounding Electrode System:

1. Provide a grounding electrode system in accordance with NFPA 70 Article 250 and as indicated on the Drawings.
2. Grounding conductor terminations:
 - a. Ground bars mounted on wall, use compression type terminal and bolt it to the ground bar with two bolts.
 - b. Ground bars in electrical equipment, use compression type terminal and bolt it to the ground bar.
 - c. Piping systems use mechanical type connections.

- d. Building steel, below grade and encased in concrete, use compression type connector or exothermic weld.
- e. At all above grade terminations, the conductors shall be labeled per Specification Section 10 14 00 – Identification Devices.
- 3. Ground ring grounding system:
 - a. Ground ring consists of ground rods and a grounding conductor looped around the structure.
 - b. Placed at a minimum of 4 FT from the structure foundation and 2 FT-6 IN below grade.
 - c. Building/Structure grounding:
 - 1) Bond building/structure metal support columns to the ground ring at all corners of the structure.
 - d. Grounding conductor: Bare conductor, size as indicated on the Drawings.
 - e. Ground rod test stations:
 - 1) Provide where indicated on the Drawings..
 - 2) Grounding conductors connected to ground rod with removable ground clamps.
- C. Supplemental Grounding Electrode:
 - 1. Provide the following grounding in addition to the equipment ground conductor supplied with the feeder conductors whether or not shown on the Drawings.
 - 2. Metal light poles:
 - a. Connect metal pole to a ground rod.
 - b. Grounding conductor: Bare #6 AWG minimum.
 - 3. Equipment support rack and pedestals mounted outdoors:
 - a. Connect metallic structure to a ground rod.
 - b. Grounding conductor: #6 AWG minimum.
- D. Low Voltage Transformer Separately Derived Grounding System:
 - 1. Ground separately mounted step-down transformers XO terminal to one of the following:
 - a. Closest building steel using mechanical type terminal bolted to the steel, compression type connection or exothermic weld.
 - b. Closest water pipe using a mechanical type connection.
 - 2. Ground step-down transformer integrally mounted in motor control centers to motor control center ground bus.

E. Raceway Bonding/Grounding:

1. All metallic conduit shall be installed so that it is electrically continuous.
2. All conduits to contain a grounding conductor with insulation identical to the phase conductors, unless otherwise indicated on the Drawings.
3. NFPA 70 required grounding bushings shall be of the insulating type.
4. Provide double locknuts at all panels.
5. Bond all conduit, at entrance and exit of equipment, to the equipment ground bus or lug.
6. Provide bonding jumpers if conduits are installed in concentric knockouts.
7. Make all metallic raceway fittings and grounding clamps tight to ensure equipment grounding system will operate continuously at ground potential to provide low impedance current path for proper operation of overcurrent devices during possible ground fault conditions.

F. Equipment Grounding:

1. All utilization equipment shall be grounded with an equipment ground conductor.

G. Manhole and Handhole Grounding:

1. Provide a ground rod and ground bar, when indicated or as needed, in each manhole and handhole with exposed metal parts.
 - a. Expose a minimum of 4 IN of the rod above the floor for field connections to the rod.
2. Connect all exposed metal parts (e.g., conduits and cable racks) to the ground rod.

3.2 FIELD QUALITY CONTROL

A. Leave grounding system uncovered until observed by Owner's Representative.

B. Ground Rod Testing:

1. Test each ground rod using a three point Fall-of-Potential tester (AMEC 4620 or 4630) or a Clamp-On tester (AMEC 6416).
2. Test resistance of installed ground system after backfilling and before connection to any other grounded system including underground piping, utility services or other building ground systems and before energizing of equipment.

END OF SECTION

SECTION 26 05 33
RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Material and installation requirements for:

- a. Conduits.
- b. Conduit fittings.
- c. Conduit supports.
- d. Wireways.
- e. Outlet boxes.
- f. Pull and junction boxes.

B. Related Specification Sections include but are not necessarily limited to:

- 1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
- 2. Division 01 – General Requirements.
- 3. Section 10 14 00 – Identification Devices
- 4. Section 26 05 00 – Electrical: Basic Requirements.
- 5. Section 26 05 43 – Electrical: Exterior Underground.
- 6. Section 26 27 26 – Wiring Devices.

1.2 MEASUREMENT AND PAYMENT

A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

B. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.3 QUALITY ASSURANCE

A. Referenced Standards:

- 1. American Iron and Steel Institute (AISI).
- 2. ASTM International (ASTM):
 - a. A123 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - b. A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

- c. D2564 – Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
- d. F512 – Standard Specification for Smooth-Wall Poly(Vinyl Chloride) (PVC) Conduit and Fittings for Underground Installation.
- 3. National Electrical Manufacturers Association (NEMA):
 - a. 250 – Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. RN 1 – Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit (IMC).
 - c. TC 2 – Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
 - d. TC 3 – Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.
- 4. National Electrical Manufacturers Association/American National Standards Institute (NEMA/ANSI):
 - a. C80.1 – Electric Rigid Steel Conduit (ERSC).
 - b. C80.3 – Steel Electrical Metallic Tubing (EMT).
 - c. OS 1 – Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box
 - d. Supports.
- 5. National Fire Protection Association (NFPA):
 - a. 70 – National Electrical Code (NEC).
- 6. Underwriters Laboratories, Inc. (UL):
 - a. 1 – Standard for Flexible Metal Conduit.
 - b. 6 – Standard for Electrical Rigid Metal Conduit - Steel.
 - c. 50 – Enclosures for Electrical Equipment, Non-Environmental Considerations.
 - d. 360 – Standard for Liquid-Tight Flexible Steel Conduit.
 - e. 467, Grounding and Bonding Equipment.
 - f. 514A – Metallic Outlet Boxes.
 - g. 514B – Conduit, Tubing, and Cable Fittings.
 - h. 651 – Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings.
 - i. 797 – Electrical Metallic Tubing - Steel.
 - j. 870 – Standard for Wireways, Auxiliary Gutters, and Associated Fittings.
 - k. 886 – Standard for Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations.

1.4 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
2. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
 - 1) Conduit fittings.
 - 2) Support systems.
 - b. See Specification Section 26 05 00 – Electrical Basic Requirements for additional requirements.
3. Fabrication and/or layout drawings:
 - a. Identify dimensional size of pull and junction boxes to be used.

1.5 DELIVERY, STORAGE, AND HANDLING

- ### **A. See Specification Section 26 05 00 – Electrical Basic Requirements.**

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- #### **A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:**
1. Rigid metallic conduits:
 - a. Allied Tube and Conduit Corporation.
 - b. Triangle PWC Inc.
 - c. Western Tube and Conduit Corporation.
 - d. Wheatland Tube Company.
 - e. LTV Steel Company.
 2. PVC coated rigid metallic conduits:
 - a. Perma-Cote.
 - b. Rob-Roy Ind.
 - c. Plastibond.
 - d. KorKap.
 3. Rigid non-metallic conduit:
 - a. Carlon.
 - b. Cantex.
 - c. Osburn Associates.

4. Liquidtight Non-metallic Conduit
 - a. Carlon
 - b. Carflex
5. Liquidtight Metallic Conduit
 - a. Anaconda or Equal
6. Wireway:
 - a. Hoffman Engineering Company.
 - b. Wiegmann.
 - c. B-Line.
7. Conduit fittings and accessories:
 - a. Appleton.
 - b. Crouse-Hinds.
8. Support systems:
 - a. Unistrut Building Systems.
 - b. B-Line Systems Inc.
 - c. Globe Strut
9. Outlet, pull and junction boxes:
 - a. Hoffman Engineering Co.
 - b. Wiegmann.
 - c. B-Line Circle AW.
10. Anti-seize compound
 - a. Crouse Hinds STL8
 - b. GB 0X-800

B. Submit request for substitution in accordance with Specification
Section 01 25 13 – Product Substitutions.

2.2 RIGID METALLIC CONDUITS

- A. PVC-Coated Rigid Steel Conduit (PVC-RGS):
1. Nominal 40 mil Polyvinyl Chloride Exterior Coating:
 - a. Coating: Bonded to hot-dipped galvanized rigid steel conduit conforming to NEMA/ANSI C80.1.
 - b. The bond between the PVC coating and the conduit surface: Greater than the tensile strength of the coating.
 2. Conduit must have ETL rating.
 3. Nominal 2 mil, minimum, urethane interior coating.

4. Urethane coating on threads.
 5. Conduit: Epoxy prime coated prior to application of PVC and urethane coatings.
 6. Female Ends:
 - a. Have a plastic sleeve extending a minimum of 1 pipe diameter or 2 IN,
 - b. whichever is less beyond the opening.
 - c. The inside diameter of the sleeve shall be the same as the outside
 - d. diameter of the conduit to be used with it.
 7. Standards: NEMA/ANSI C80.1, UL 6, NEMA RN 1.
- B. Rigid Aluminum Conduit (RAC):
1. AA Type 6063 aluminum alloy, T-1 temper.
 2. Maximum copper content of 0.10 percent.
 3. Extruded, seamless.
 4. Standards: NEMA/ANSI C80.5, UL 6.

2.3 RIGID NON-METALLIC CONDUIT

- A. Schedules 40 (PVC-40) and 80 (PVC-80):
1. Polyvinyl-chloride (PVC) plastic compound which includes inert modifiers to improve weatherability and heat distribution.
 2. Rated for direct sunlight exposure.
 3. Fire retardant and low smoke emission.
 4. Shall be suitable for use with 90 DegC wire and shall be marked "maximum 90 DegC".
 5. Standards: NEMA TC 2, UL 651.

2.4 LIQUIDTIGHT FLEXIBLE CONDUIT

- A. Non-metallic Type:
1. Carlon Carflex.
- B. Metallic Type:
1. Anaconda or Equal with Aluminum Core

2.5 WIREWAY

- A. General:
1. Suitable for lay-in conductors.
 2. Designed for continuous grounding.
 3. Covers:
 - a. Hinged or removable in accessible areas.

- b. Non-removable when passing through partitions.
- 4. Finish: Rust inhibiting primer and manufacturers standard paint inside and out except for stainless steel type.
- 5. Standards: UL 870, NEMA 250.
- B. Watertight (NEMA 4X rated) Wireway:
 - 1. 14 GA 316 stainless steel bodies and covers without knockouts.
 - 2. Cover: Fully gasketed and held in place with continuous (piano) hinged.

2.6 CONDUIT FITTINGS AND ACCESSORIES (Appleton or Crouse Hinds only)

- A. Fittings for Use with RGS:
 - 1. General:
 - a. In hazardous locations listed for use in Class I, Groups C and D locations. Also use for above ground installations in exterior/wet/damp locations.
 - 2. Locknuts:
 - a. Threaded steel or malleable iron.
 - b. Gasketed or non-gasketed.
 - c. Grounding or non-grounding type.
 - 3. Bushings:
 - a. Threaded, insulated metallic.
 - b. Grounding or non-grounding type.
 - 4. Hubs: Threaded, insulated and gasketed metallic for raintight connection.
 - 5. Couplings:
 - a. Threaded straight type: Same material and finish as the conduit with which they are used on.
 - 6. Unions: Threaded copper free cast aluminum.
 - 7. Conduit bodies Form 9 (ells and tees):
 - a. Body: Cast copper free aluminum with threaded hubs, Form 9.
 - b. Standard and mogul size.
 - c. Cover:
 - 1) Screw-on type with stainless steel screws.
 - 2) Gasketed or non-gasketed cast copper free aluminum.
 - 8. Conduit bodies (round):
 - a. Body: Cast copper free aluminum with threaded hubs.
 - b. Cover: Threaded screw on type, gasketed, cast copper free aluminum.

B. Fittings for Use with PVC-RGS:

1. The same material and construction as those fittings listed under paragraph "Fittings for Use with RGS" and coated as defined under paragraph "PVC Coated Rigid Steel Conduit (PVC-RGS)."

C. Fittings for Use with Liquidtight Flexible Non-metallic Conduit:

1. Connector:
 - a. Straight or angle type.
 - b. Carlon LT Series.

D. Fittings for Use with Liquidtight Flexible Metallic Conduit:

1. Connector:
 - a. Straight or angle type.
 - b. Crouse Hinds LT Series Aluminum Type (or Equal) ½" – 4".

E. Fittings for Use with Rigid Non-Metallic PVC Conduit:

1. Coupling, adapters and conduit bodies:
 - a. Same material, thickness, and construction as the conduits with which they are used.
 - b. Homogeneous plastic free from visible cracks, holes or foreign inclusions.
 - c. Bore smooth and free of blisters, nicks or other imperfections which could damage the conductor.
2. Solvent cement for welding fittings shall be supplied by the same manufacturer as the conduit and fittings.
3. Standards: ASTM D2564, NEMA TC 3, UL 651, UL 514B.

F. Weather and Corrosion Protection Tape:

1. PVC based tape, 10 mils thick.
2. Protection against moisture, acids, alkalis, salts and sewage and suitable for direct bury.
3. Used with appropriate pipe primer.

2.7 ALL RACEWAY AND FITTINGS

A. Mark Products:

1. Identify the nominal trade size on the product.
2. Stamp with the name or trademark of the manufacturer.

2.8 OUTLET BOXES

A. Cast Outlet Boxes:

1. Die-cast copper free aluminum with manufacturers standard finish.

2. Threaded hubs and grounding screw.
 3. Styles:
 - a. "FS" or "FD".
 - b. Single or multiple gang and tandem.
 - c. "EDS" or "EFS" for hazardous locations.
 4. Standards: UL 514A, UL 886.
- B. See Specification Section 26 27 26 – Wiring Devices for wiring devices, wall plates and cover plates.

2.9 PULL AND JUNCTION BOXES

- A. NEMA 4X Rated (metallic):
1. Body and cover: 14 GA Type 316 stainless steel with continuously hinged door.
 2. Seams continuously welded and ground smooth.
 3. No knockouts.
 4. External mounting flanges.
 5. Hinged door and stainless steel screws and clamps.
 6. Door with oil-resistant gasket.
- B. Miscellaneous Accessories:
1. Rigid handles for covers larger than 9 SF or heavier than 25 LBS.
 2. Split covers when heavier than 25 LBS.
 3. Weldnuts for mounting optional panels and terminal kits.
 4. Tamper proof screws.
 5. Terminal blocks: Screw-post barrier-type, rated 600 volt and 20 ampere minimum.
- C. Standards: NEMA 250, UL 50.

2.10 SUPPORT SYSTEMS

- A. Multi-conduit Surface or Trapeze Type Support and Pull or Junction Box Supports:
1. Material requirements:
 - a. Stainless steel: AISI Type 316 with Type 316 hardware.
- B. Single Conduit and Outlet Box Support Fasteners:
1. Material requirements:
 - a. 316 Stainless steel with Type 316 stainless steel hardware.

2.11 OPENINGS AND PENETRATIONS IN WALLS AND FLOORS

- A. Sleeves, smoke and fire stop fitting through walls and floors:
 - 1. See Specification Section 01 73 20.

PART 3 - EXECUTION

3.1 RACEWAY INSTALLATION - GENERAL

- A. Shall be in accordance with the requirements of:
 - 1. NFPA 70.
 - 2. Manufacturer instructions.
 - 3. Specification Section 10 14 00 – Identification Devices
- B. Size of Raceways:
 - 1. Raceway sizes are shown on the Drawings, if not shown on the Drawings, then size in accordance with NFPA 70.
 - 2. Unless specifically indicated otherwise, the minimum raceway size shall be:
 - a. Above Ground Conduit: 3/4 IN and 1 IN where underground.
 - b. Wireway: 4 IN x 4 IN.
- C. Field Bending and Cutting of Conduits:
 - 1. Utilize tools and equipment recommended by the manufacturer of the conduit, designed for the purpose and the conduit material to make all field bends and cuts.
 - 2. Do not reduce the internal diameter of the conduit when making conduit bends.
 - 3. Utilize tools and equipment to prevent damage to PVC coated conduits, PVC coating, to include using the appropriate dies and vice jaws.
 - 4. Debur interior and exterior after cutting.
 - 5. Male threads of Aluminum conduit systems shall be coated with an electrically conductive anti-seize compound GB 0X-800 or Crouse Hinds STL8.
- D. The protective coating integrity of conduits, fittings, outlet, pull and junction boxes and accessories shall be maintained.
 - 1. Repair PVC coated components utilizing a patching compound, of the same material as the coating, provided by the manufacturer of the conduit; or a self-adhesive, highly conformable, cross-linked silicone composition strip, followed by a protective coating of vinyl tape.
 - a. Total nominal thickness: 40 mil.
 - 2. Repair surfaces which will be inaccessible after installation prior to installation.

- E. Remove moisture and debris from conduit before wire is pulled into place.
 - 1. Pull mandrel with diameter nominally 1/4 IN smaller than the interior of the conduit, to remove obstructions.
 - 2. Swab conduit by pulling a clean, tight-fitting rag through the conduit.
 - 3. Tightly plug ends of conduit with tapered wood plugs or plastic inserts until wire is pulled.
- F. Only nylon or polyethylene rope shall be used to pull wire and cable in conduit systems.
- G. Where portions of a raceway are subject to different temperatures and where condensation is known to be a problem, as in cold storage areas of buildings or where passing from the interior to the exterior of a building, the raceway shall be sealed to prevent circulation of warm air to colder section of the raceway.
- H. Fill openings in walls, floors, and ceilings and finish flush with surface.
 - 1. See Specification Section 01 73 20 – Openings and Penetrations.

3.2 RACEWAY ROUTING

- A. Raceways shall be routed in the field unless otherwise indicated.
 - 1. Conduit and fittings shall be installed, as required, for a complete system that has a neat appearance and is in compliance with all applicable codes.
 - 2. Run in straight lines parallel to or at right angles to building lines.
 - 3. Do not route conduits:
 - a. Through areas of high ambient temperature or radiant heat.
 - b. In suspended concrete slabs.
 - 4. Conduit shall not interfere with, or prevent access to, piping, valves, ductwork, or other equipment for operation, maintenance and repair.
 - 5. Provide pull boxes or conduit bodies as needed so that there is a maximum of 270 degrees of bends or 3-90 degree bends in the conduit run or in long straight runs to limit pulling tensions.
- B. All rigid conduits within a structure shall be installed exposed except as follows:
 - 1. As indicated on the Drawings.
 - 2. Concealed above gypsum wall board or acoustical tile suspended ceilings.
 - 3. Concealed within stud frame, poured concrete, concrete block and brick walls of an architecturally finished area.
- C. Maintain minimum spacing between parallel conduit and piping runs in accordance with the following when the runs are greater than 30 FT:
 - 1. Between instrumentation and telecommunication: 1 IN.
 - 2. Between instrumentation and 125 V, 48 V and 24 Vdc, 2 IN.

3. Between instrumentation and 600 V and less AC power or control: 12 IN.
 4. Between instrumentation and greater than 600 Vac power: 12 IN.
 5. Between telecommunication and 125 V, 48 V and 24 Vdc, 2 IN.
 6. Between telecommunication and 600 V and less AC power or control: 6 IN
 7. Between telecommunication and greater than 600 Vac power: 12 IN.
 8. Between 125 V, 48 V and 24 Vdc and 600 V and less AC power or control: 12 IN.
 9. Between 125 V, 48 V and 24 Vdc and greater than 600 Vac power: 2 IN.
 10. Between 600 V and less AC and greater than 600 Vac: 2 IN.
 11. Between process, gas, air and water pipes: 6 IN.
- D. Conduits shall be installed to eliminate moisture pockets.
1. Where water cannot drain to openings, provide drain fittings in the low spots of the conduit run.
- E. Conduit shall not be routed on the exterior of structures except as specifically indicated on the Drawings.
- F. Flexible conduit shall not be routed through walls. Only the proper rigid conduit types, for the area, may be used to pass through walls.
- G. Where sufficient room exists within the housing of roof-mounted equipment, the conduit shall be stubbed up inside the housing.
- H. Provide all required openings in walls, floors, and ceilings for conduit penetration.
1. See Specification Section 01 73 20 – Openings and Penetrations.

3.3 RACEWAY APPLICATIONS

- A. Permitted Raceway Types Per Wire or Cable Types:
1. Power wire or cables: All raceway types.
 2. Control wire or cables: All raceway types.
 3. Instrumentation cables: Metallic raceway except non-metallic may be used underground.
 4. Motor leads from a VFD (ASD): RGS, RAC or shielded VFD (ASD) cables in all other raceways.
 5. Telecommunication cables: All raceway types.
- B. Permitted Raceway Types Per Area Designations:
1. Dry areas:
 - a. RAC.
 - b. Liquidtight Flexible Metallic Conduit.

2. Wet areas:
 - a. RAC.
 - b. Liquidtight Flexible Metallic Conduit.
 3. Corrosive areas:
 - a. PVC-RGS.
 - b. PVC-80.
 - c. Liquidtight Flexible Non-metallic Conduit
 4. Highly corrosive areas:
 - a. PVC-RGS.
 - b. PVC-80.
 - c. Liquidtight Flexible Non-metallic Conduit.
 5. NFPA 70 hazardous areas:
 - a. RAC when required by other area designations.
- C. Permitted Raceway Types Per Routing Locations:
1. In stud framed walls:
 - a. EMT.
 2. In concrete block or brick walls:
 - a. PVC-40.
 3. Above acoustical tile ceilings:
 - a. NEMA 1 rated wireway.
 4. Transition from underground to above ground:
 - a. PVC-RGS when transitioning from underground to above ground.
 5. Beneath floor slab-on-grade:
 - a. PVC-40 for horizontal runs. PVC-RGS for stub-ups.
 6. Through floor penetrations, see Specification Section 01 73 20 – Openings and Penetrations:
 - a. PVC-RGS for floor penetrations in areas designated as wet, corrosive or highly corrosive.
 7. Direct buried conduits and duct banks are not allowed.
 8. Reinforced Concrete encased duct banks:
 - a. PVC-40.
 - b. 90 degree elbows for transitions to above grade:
 - 1) PVC-RGS.

- D. FLEX conduits shall be installed for connections to light fixtures, HVAC equipment and other similar devices above ceilings.
 - 1. The maximum length shall not exceed:
 - a. 6 FT to light fixtures.
 - b. 3 FT to all other equipment.
- E. FLEX-NM - CARFLEX conduits shall be installed as the final conduit connection to light fixtures, dry type transformers, motors, electrically operated valves, instrumentation primary elements, and electrical equipment that is liable to vibrate.
 - 1. The maximum length shall not exceed:
 - a. 6 FT to light fixtures.
 - b. 3 FT to motors.
 - c. 2 FT to all other equipment
- F. NEMA 4X Rated Wireway:
 - 1. Surface mounted in areas designated as wet and or corrosive.
- G. Underground Conduit: See Specification Section 26 05 43 – Electrical Exterior Underground.

3.4 CONDUIT FITTINGS AND ACCESSORIES

- A. Rigid non-metallic conduit and fittings shall be joined utilizing solvent cement.
 - 1. Immediately after installation of conduit and fitting, the fitting or conduit shall be rotated 1/4 turn to provide uniform contact.
- B. Threaded connections shall be made wrench-tight.
- C. Conduit joints shall be watertight:
 - 1. Where subjected to possible submersion.
 - 2. In areas classified as wet.
 - 3. Underground.
- D. Terminate Conduits:
 - 1. In metallic outlet boxes:
 - a. RAC:
 - 1) Aluminum Conduit hub and locknut.
 - 2) Use grounding type hub or bushing when required by NFPA 70.
 - 2. In NEMA 1 rated enclosures:
 - a. Aluminum Watertight, insulated and gasketed hub and locknut.
 - 3. In NEMA 4X rated enclosures:

- a. Aluminum Watertight, insulated and gasketed hub and locknut.
- 4. In NEMA 7 and NEMA 9 rated enclosures:
 - a. Into an integral threaded hub.
 - b. With end bells on non-metallic conduits.
- E. Threadless couplings not acceptable.

3.5 CONDUIT SUPPORT

- A. Permitted single and multi-conduit surface or trapeze type support system per area designations:
 - 1. Architecturally finished areas:
 - a. Material: Zinc plated steel, or steel protected with zinc phosphate and oil finish.
 - b. Types of fasteners: Spring type hangers and clips, straps, hangers with bolts, clamps with bolts and bolt on beam clamps.
 - c. Provide anti-rattle conduit supports when conduits are routed through metal studs.
 - 2. Dry or wet and/or hazardous areas:
 - a. Material: Aluminum straps and clamps.
 - 3. Conduit type shall be compatible with the support fastener material.
 - a. Aluminum system may be used with aluminum RAC.
 - b. PVC coated fasteners may be used with PVC-Coated Conduit.
 - c. Non-metallic fasteners may be used with PVC-40, PVC-80.
- B. Conduit Support General Requirements:
 - 1. Maximum spacing between conduit supports per NFPA 70.
 - 2. Support conduit from the building structure.
 - 3. Do not support conduit from process, gas, air or water piping; or from other conduits.
 - 4. Provide hangers and brackets to limit the maximum uniform load on a single support to 25 LBS or to the maximum uniform load recommended by the manufacturer if the support is rated less than 25 LBS.
 - a. Do not exceed maximum concentrated load recommended by the manufacturer on any support.
 - b. Conduit hangers:
 - 1) Continuous threaded rods combined with struts or conduit clamps: Do not use perforated strap hangers and iron bailing wire.
 - c. Do not use suspended ceiling support systems to support raceways.

- d. Hangers in metal roof decks:
 - 1) Utilize fender washers.
 - 2) Not extend above top of ribs.
 - 3) Not interfere with vapor barrier, insulation, or roofing.
- 5. Conduit support system fasteners:
 - a. Use Type 316 stainless steel sleeve-type expansion anchors as fasteners in masonry walls or concrete surfaces.
 - b. Do not use concrete nails and powder-driven fasteners.

3.6 OUTLET, PULL AND JUNCTION BOX INSTALLATION

A. General:

- 1. Install products in accordance with manufacturer's instructions
- 2. Install approved thread grease on all plugs prior to installation.
- 3. See Specification Section 26 05 00 – Electrical Basic Requirements and the Drawings for area classifications
- 4. Fill unused punched-out, tapped, or threaded hub openings with insert plugs. Size boxes to accommodate quantity of conductors enclosed and quantity of conduits connected to the box

B. Outlet Boxes:

- 1. Permitted uses of cast outlet boxes:
 - a. Housing of wiring devices surface mounted in non-architecturally finished dry, wet, corrosive, highly corrosive and hazardous areas.
 - b. Pull and junction box surface mounted in non-architecturally finished dry, wet, corrosive and highly corrosive areas.
- 2. Mount device outlet boxes where indicated on the Drawings and at heights as scheduled in Specification Section 26 05 00 – Electrical Basic Requirements.
- 3. Set device outlet boxes plumb and vertical to the floor.
- 4. Outlet boxes recessed in walls:
 - a. Install with appropriate stud wall support brackets or adjustable bar hangers so that they are flush with the face of the wall.
 - b. Locate in ungrouted cell of concrete block with bottom edge of box flush with bottom edge of block and flush with the face of the block.
- 5. Place barriers between switches in boxes with 277 V switches on opposite phases.
- 6. Back-to-back are not permitted.

C. Pull and Junction Boxes:

1. Install pull or junction boxes in conduit runs where indicated or required to facilitate pulling of wires or making connections.
 - a. Make covers of boxes accessible.
2. Permitted uses of NEMA 4X 316 metallic enclosure:
 - a. Pull or junction box surface mounted in areas designated as wet and/or corrosive.

END OF SECTION

SECTION 26 05 43

ELECTRICAL EXTERIOR UNDERGROUND

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Material and installation requirements for:
 - a. Manholes.
 - b. Pull Boxes and Handholes.
 - c. Underground conduits and duct banks.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.
3. Division 03 – Concrete.
4. Section 10 14 00 – Identification Devices.
5. Section 26 05 26 – Grounding.
6. Section 26 05 33 – Raceways and Boxes.
7. Section 31 21 33 – Trenching, Backfilling and Compacting for Utilities.

1.2 MEASUREMENT AND PAYMENT

- A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.
- B. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.3 QUALITY ASSURANCE

A. Referenced Standards:

1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. Standard Specifications for Highway Bridges.
 - b. A48/A48M-03 – standard specification for gray iron castings.
2. ASTM International (ASTM):
 - a. A536 – Standard Specification for Ductile Iron Castings.
3. National Fire Protection Association (NFPA):
 - a. 70 – National Electrical Code (NEC).

4. Society of Cable Telecommunications Engineers (SCTE):
 - a. 77 – Specification for Underground Enclosure Integrity.

1.4 DEFINITIONS

- A. Direct Buried conduits are not used on this project.
- B. Concrete encased duct bank: An individual (single) or multiple conduits, arranged in one or more planes, encased in a common concrete envelope. All underground conduits on this project are to be installed in concrete encased duct bank.

1.5 SUBMITTALS

- A. Shop Drawings:
 1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
 2. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
 3. Fabrication and/or layout drawings:
 - a. Provide dimensional drawings of each manhole indicating all specified accessories and conduit entry locations.
 - b. Layout drawings for all conduit runs, coordinated with all conduit.
 - c. Provide detailed layout drawings showing the following as a minimum:
 - 1) Physical dimensions of the system.
 - 2) Dimension cable trench to other utilities in the path of the trench.
 - 3) Dimension cable trench to site structures.
 - 4) Cross-sectional sketch of the trench showing:
 - a) Power cable runs.
 - b) Control cable runs and support.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 1. Precast concrete pull boxes:
 - a. Oldcastle Precast, Inc.
 2. Precast concrete manholes and handholes:
 - a. Oldcastle Precast, Inc.

3. Manhole, pull box, handhole and duct bank accessories:
 - a. Unistrut.
 - b. Condux International, Inc.
 - c. Underground Devices, Inc.
- B. Submit request for substitution in accordance with Specification Section 01 25 13 – Product Substitutions.

2.2 MANHOLES, PULL BOXES AND HANDHOLES

- A. Precast Concrete Manholes, Pull Boxes and Handholes:
 1. Precast concrete, steel reinforced structures:
 - a. Shall have an AASHTO live load rating of H-20 for full deliberate vehicle traffic.
 - b. Mating edges: Tongue and groove type.
 - c. Solid bottom with a 12 IN x 12 IN or 12 IN DIA sump in the bottom. Do not knockout the bottom of the sump for draining.
 - d. Locate sump directly beneath manhole cover.
 - e. Cover extension rings as required.
 - f. Cable pulling eyes opposite all conduit entrances.
 - 1) Coordinate exact location with installation contractor.

2.3 CONCRETE MANHOLE, PULL BOX AND HANDHOLE ACCESSORIES

- A. Cover and Frame:
 1. Cast ductile iron: ASTM A536.
 2. AASHTO live load rating: H-20.
 3. Diameter: 36 IN.
 4. Cast the legend "ELECTRICAL" or "COMMUNICATIONS" into covers.
- B. Cable Racks and Hooks:
 1. Material: Heavy-duty non-metallic (glass reinforced nylon).
 2. Hook loading capacity: 400 LBS minimum.
 3. Rack loading capacity: Four (4) hooks maximum.
 4. Hook deflection: 0.25 IN maximum.
 5. Hooks: Length, as required, with positive locking device to prevent upward movement.
 6. Mounding hardware: Type 316 stainless steel.
- C. Cable Pulling Irons:
 1. 7/8 IN DIA hot-dipped galvanized steel.

2. 6000 LB minimum pulling load.
- D. Ground Rods and Grounding Equipment: See Specification Section 26 05 26 – Grounding.

2.4 UNDERGROUND CONDUIT AND ACCESSORIES

- A. Concrete: Comply with Division 03 Specifications.
- B. Conduit: See Specification Section 26 05 33 – Raceways and Boxes.
- C. Duct Spacers/Supports:
 1. High density polyethylene or high impact polystyrene.
 2. Interlocking.
 3. Provide minimum spacing between conduits, per NEC.
 4. Accessories, as required:
 - a. Hold down bars.
 - b. Duct bank strapping.

PART 3 - EXECUTION

3.1 GENERAL

- A. Drawings indicate the intended location of manholes, pull boxes and handholes and routing of duct banks and direct buried conduit.
 1. Field conditions may affect actual routing.
- B. Manhole, Pull Box and Handhole Locations:
 1. Approximately where shown on the Drawings.
 2. As required for pulling distances.
 3. As required to keep pulling tensions under allowable cable tensions.
 4. As required for number of bends in duct bank routing.
 5. Shall not be installed in a swale or ditch.
 6. Determine the exact locations after careful consideration has been given to the location of other utilities, grading, and paving.
 7. Locations are to be approved by the Principal Architect/Engineer prior to excavation and placement or construction.
- C. Install products in accordance with manufacturer's instructions.
- D. Install manholes, pull boxes and handholes in conduit runs where indicated or as required to facilitate pulling of wires or making connections.
- E. Comply with Specification Section 31 21 33 – Trenching, Backfilling and Compacting for Utilities for trenching, backfilling and compacting.

3.2 MANHOLES, PULL BOXES AND HANDHOLES

A. Precast Manholes, Pull Boxes and Handholes:

1. For use in vehicular and non-vehicular traffic areas.
2. Construction:
 - a. Grout or seal all joints, per manufacturer's instructions.
 - b. Support cables on walls by cable racks:
 - 1) Provide a minimum of two (2) racks, install symmetrically on each wall of manholes, pull boxes and handholes.
 - a) Provide additional cable racks, as required, so that both ends of cable splices will be supported horizontally.
 - 2) Equip cable racks with adjustable hooks: Quantity of cable hooks as required by the number of conductors to be supported.
 - c. In each manhole, pull box and handhole:
 - 1) Connect all metallic components to the system ground wire routed with duct banks by means of #8 AWG minimum copper wire via exothermic weld or approved grounding clamps.
 - 2) Utilize a ground bar in the manhole, pull box or handhole if the quantity of ground wires exceeds three (3).
3. Place manhole, pull box or handhole on a foundation of compacted 1/4 to 1/2 IN crushed rock or gravel a minimum of 8 IN thick and 6 IN larger than manhole, pull box or handhole footprint on all sides.
4. Install so that the top of cover is 1 IN above finished grade.
 - a. Where existing grades are higher than finished grades, install sufficient number of courses of curved segmented concrete block between top of handhole, pull box and manhole frame to temporarily elevate manhole cover to existing grade level.
5. After installation is complete, backfill and compact soil around manholes and handholes.
6. Handhole size:
 - a. As indicated on the Contract Drawings or as required for the number and size of conduits entering.
7. Manhole size:
 - a. As indicated on the Drawings or as required for the number and size of conduits entering.
 - 1) Minimum floor dimension of 6 FT x 6 FT and a minimum depth of 6 FT.

3.3 UNDERGROUND CONDUITS

A. General Installation Requirements:

1. Duct bank types per location:
 - a. Reinforced concrete duct bank:
 - 1) All duct banks shall be concrete reinforced per SJRA installation detail.
 - 2) As shown on drawings
2. Do not concrete encase duct banks until conduits have been observed by the Owner's representative.
3. Duct banks shall be sloped a minimum of 4 IN per 100 FT or as detailed on the Drawings.
 - a. Low points shall be at manholes, pull boxes or handholes.
4. During construction and after conduit installation is complete, plug the ends of all conduits.
5. Provide conduit supports and spacers.
 - a. Place supports and spacers for rigid nonmetallic conduit on maximum centers as indicated for the following trade sizes:
 - 1) 1 IN and less: 3 FT.
 - 2) 1-1/4 to 3 IN: 5 FT.
 - 3) 3-1/2 to 6 IN: 7 FT.
 - b. Place supports and spacers for rigid steel conduit on maximum centers as indicated for the following trade sizes:
 - 1) 1 IN and less: 10 FT.
 - 2) 1-1/4 to 2-1/2 IN: 14 FT.
 - 3) 3 IN and larger: 20 FT.
 - c. Securely anchor conduits to supports and spacers to prevent movement during placement of concrete.
6. Stagger conduit joints at intervals of 6 IN vertically.
7. Make conduit joints watertight and in accordance with manufacturer's recommendations.
8. Accomplish changes in direction of runs exceeding a total of 15 degrees by long sweep bends having a minimum radius of 25 FT.
 - a. Sweep bends may be made up of one or more curved or straight sections or combinations thereof.
9. Furnish manufactured bends at end of runs.

- a. Minimum radius of 18 IN for conduits less than 3 IN trade size and 36 IN for conduits 3 IN trade size and larger.
 10. Field cuts requiring tapers shall be made with the proper tools and shall match factory tapers.
 11. After the conduit run has been completed:
 - a. Prove joint integrity and test for out-of-round duct by pulling a test mandrel through each conduit.
 - 1) Test mandrel:
 - a) Length: Not less than 12 IN
 - b) Diameter: Approximately 1/4 IN less than the inside diameter of the conduit.
 - b. Clean the conduit by pulling a heavy duty wire brush mandrel followed by a rubber duct swab through each conduit.
 12. Pneumatic rodding may be used to draw in lead wire.
 - a. Install a heavy nylon cord free of kinks and splices in all unused new ducts.
 - b. Extend cord 3 FT beyond ends of conduit.
 13. Transition from rigid non-metallic conduit to rigid metallic conduit, per Specification Section 26 05 33 – Raceways and Boxes, prior to entering a structure or going above ground.
 - a. Except rigid non-metallic conduit may be extended directly to manholes, handholes, pad mounted transformer boxes and other exterior pad mounted electrical equipment where the conduit is concealed within the enclosure.
 - b. Terminate rigid PVC conduits with end bells.
 - c. Terminate steel conduits with insulated bushings.
 14. Place warning tape in trench directly over duct banks, direct-buried conduit, and direct-buried wire and cable in accordance with Specification Section 10 14 00, 12-inch minimum cover.
 15. Placement of conduits stubbing into Pull boxes, handholes and manholes shall be located to allow for proper bending radiuses of the cables.
- B. Concrete Encased Duct Bank:**
1. Duct bank system consists of conduits completely encased in minimum 3 IN of red colored concrete (8-lbs. red dye/CY) and with separations between different cabling types as required in Specification Section 26 05 33 – Raceways and Boxes or as detailed on the Drawings.
 2. Install so that top of concrete encased duct, at any point, is not less than 36 IN below grade and is also below pavement sub-grade.

3. Where identified and for a distance 10 FT either side of the area, the concrete shall be reinforced.
 - a. The reinforcement shall consist of # 5 longitudinal bars placed 6 IN on centers surrounding the ducts with # 4 vertical stirrups placed at 36 IN centers as detailed on the Drawings.
4. Conduit supports shall provide a uniform minimum clearance of 3 IN between the bottom of the trench and the bottom row of conduit.
5. Conduit separators shall provide a uniform minimum clearance of 2 IN between conduits or as required in Specification Section 26 05 33 – Raceways and Boxes for different cabling types.

END OF SECTION

SECTION 26 41 19
ELECTRICAL DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish, install and test all equipment, wiring and appurtenances as may be required to perform the electrical demolition shown on the Drawings and as specified herein.
- B. Schedule with the Owner/Engineer for required shutdowns to accommodate system demolition and installation of temporary facilities.

1.2 MEASUREMENT AND PAYMENT

- A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.
- B. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.3 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American National Standards Institute / National Fire Protection Association (ANSI/NFPA), No. 70 – National Electrical Code (NEC), Article No. 590 – Temporary Wiring.
- B. Field Verification
 - 1. Verify field measurements and circuiting arrangements are as shown on the Drawings.
 - 2. Verify that abandoned wiring and equipment serve only abandoned facilities.
 - 3. Demolition drawings are based on casual field observation and existing record documents. Discrepancies shall be reported to the Owner/Engineer before disturbing the existing installation.
 - 4. By beginning demolition, the Contractor accepts the existing conditions and warrants that he will maintain service to equipment and items not scheduled or indicated for removal.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual Sections.

2.2 DESIGN AND CONSTRUCTION

- A. If temporary electrical wiring and facilities are required, the Contractor shall provide such wiring and facilities to comply with the NEC.

2.3 PREPARATION

- A. Disconnect electrical systems in walls, floors and ceilings scheduled for removal.
- B. Coordinate utility service outages with the Utility Company to provide continuous service to operating equipment.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits use personnel experienced in such operations.
- D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from the Owner/Engineer at least one week in advance, before partially or completely disabling system.

2.4 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Remove, relocate and extend existing installations to accommodate new construction.
- B. Remove abandoned wiring to source of supply.
- C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- D. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit serving them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.
- E. Disconnect and remove abandoned panelboards and distribution equipment.
- F. Disconnect and remove electrical devices and equipment that has been removed.
- G. Repair adjacent construction and finishes damaged during demolition and extension work.
- H. Maintain access to existing installations which remain active. Modify installation or provide access to panels as appropriate.
- I. Where the demolition or revision of any portion of a raceway or box in the raceway system, in an area, causes the raceway system of the area to no longer comply with the classification or specification requirements of the area, the Contractor shall provide and install such boxes, fittings, etc. as may be necessary to return the raceway system to compliance with Specifications.
- J. Extend existing installations using materials and methods as specified for new work.

- K. Carry out the work in an orderly and careful manner. Hold noise, dust, and vibration to a minimum and conduct the Work so as to avoid any damage to the surroundings. Remove all items and parts as shown and noted on the Drawings and as otherwise may be required to be removed to carry out the Work.
- L. Salvaged Equipment and Materials
 - 1. The Owner shall have the right to retain any or all electrical and instrumentation equipment shown or specified to be removed from the site.
 - 2. Prior to starting demolition, the Contractor and Owner/Engineers shall jointly visit the areas of demolition and the Owner/Engineer will designate those items that are to remain the property of the Owner.
 - 3. Equipment and material designated by the Owner, as remaining the property of the Owner, shall be removed from the structure and hauled to a designated location on the site and stored for the Owner's use. Store on wood runners raised above the surrounding grade and cover with weather resistant covering and tie securely or store inside Owner furnished storage as directed by the Owner/Engineer.
 - 4. Take necessary precautions in removing Owner designated property to prevent damage during the demolition process. Remove steel structural members by unbolting, cutting welds, or cutting rivet heads and punching shanks through holes. Do not use a cutting torch to separate the Owner's equipment or material unless approved by the Owner/Engineer.
 - 5. Generally, items to be salvaged, shall be removed in one piece or in a manner that does not impact their reuse. Loose components may be removed separately. Controls and electrical equipment may be removed from the equipment and handled separately. Large units may be handled separately. Salvaged piping shall be taken apart at flanges or fittings and removed in sections.
- M. Material removed from the construction site during demolition, and any equipment not otherwise designated to remain the property of the Owner in accordance with the pre-demolition identification process shall become the property of the Contractor, and shall be promptly removed from the construction site.
- N. The Contractor shall refurbish and replace any existing facility to be left in place which is damaged by the demolition operations at no additional expense to the Owner. The repair of such damage shall leave the parts in a condition at least equal to that found at the start of the Work.

2.5 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment which remain or are to be reused.

- B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

END OF SECTION

SECTION 32 90 00

SEEDING, SODDING AND LANDSCAPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Seeding, sodding and landscape planting:
2. Specification Section is applicable to 01 74 23 – Restoration of Site.

B. Related Specification Sections include, but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

- A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 QUALITY ASSURANCE

A. Referenced Standards:

1. American Nursery and Landscape Association/American National Standards Institute (ANLA/ANSI):
 - a. Z60.1 – American Standard for Nursery Stock.
2. AOAC International (AOAC – Association of Official Agricultural Chemists.).
3. ASTM International (ASTM):
 - a. D2028 – Standard Specification for Cutback Asphalt (Rapid-Curing Type).
 - b. D5276 – Standard Test Method for Drop Test of Loaded Containers by Free Fall.

B. Quality Control:

1. Fertilizer:
 - a. If Owner's Representative determines fertilizer requires sampling and testing to verify quality, testing will be done at Contractor's expense, in accordance with current methods of the AOAC.
 - b. Upon completion of Project, a final check of total quantities of fertilizer used will be made against total area seeded.

- c. If minimum rates of application have not been met, Contractor will be required to distribute additional quantities to make up minimum application specified.

1.4 SUBMITTALS

- A. Shop Drawings:
- B. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
- C. Product technical data including:
 - 1. Acknowledgement that products submitted meet requirements of standards referenced.
 - 2. Manufacturer's installation instructions.
 - 3. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.

1.5 SEQUENCING AND SCHEDULING

- A. Installation Schedule:
 - 1. Provide schedule showing when trees, shrubs, groundcovers and other plant materials are anticipated to be planted.
 - 2. Show schedule of when lawn type and other grass areas are anticipated to be planted.
 - 3. Indicate planting schedules in relation to schedule for irrigation system installation, finish grading and topsoiling.
 - 4. Indicate anticipated dates Owner's Representative will be required to review installation for initial acceptance and final acceptance.
- B. Pre-installation Meeting:
 - 1. Meet with Owner's Representative and other parties as necessary to discuss schedule and methods, unless otherwise indicated by Owner's Representative.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS AND SUPPLIERS

- A. Subject to compliance with the Contract Documents, the manufacturers and suppliers listed in the applicable Articles below are acceptable.
- B. Submit request for substitution in accordance with Specification Section 01 25 13 – Product Substitutions.

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2.2 MATERIALS

BOTANICAL AND COMMON NAME	PERCENT BY WEIGHT (PLS)	MINIMUM PERCENT GERMINATION	MINIMUM PERCENT PURITY
Kentucky Bluegrass (Poa pratensis)	60	85	95
Fescue, Tall, KY 31 (Festura arundiancea 'KY 31')	30	85	98
Ryegrass, Perennial (Lolium perenne)	10	90	95

Pasture Seeding:

BOTANICAL AND COMMON NAME	MINIMUM PERCENT GERMINATION	MINIMUM PERCENT PURITY	LBS PLS PER ACRE
Smooth Brome Grass (Bromus inermis 'Leyss')	80	90	14
Fescue, Tall, KY 31 (Festura arundiancea 'KY 31')	90	98	2.5
Switchgrass (Panicum virgatum)	90	95	3.5

BOTANICAL AND COMMON NAME	MINIMUM PERCENT GERMINATION	MINIMUM PERCENT PURITY
Pennegift Crownvetch (Coronilla veria) (Blue-tagged certified hulled)	75	98
Ryegrass, Perennial (Lolium perenne)	90	95

A. Native Grass Seeding: Certified seed of locally adapted strains.

GRASSES	LBS PLS PER ACRE	APPROXIMATE NUMBER OF SEEDS PER LB (PLS)
Big bluestem(<i>Andropogon gerardi</i>)	2.4	165,000
Blue grama(<i>Bouteloua gracilis</i>)	0.1	825,000
Green needlegrass(<i>Stipa viridula</i>)	0.6	181,000
Indian grass(<i>Sorghastrum nutans</i>)	1.2	175,000
Little bluestem 'Blaze' (<i>Andropogon scoparius</i> 'Blaze')	1.4	260,000
Sideoats grama(<i>Bouteloua curtipendula</i>)	0.8	191,000
Switchgrass(<i>Panicum virgatum</i>)	1.0	389,000
Western wheatgrass(<i>Agropyron smithii</i>)	1.5	110,000
Sand reedgrass(<i>Calamovilfia gigantea</i>)	1.0	273,000
Sand bluestem(<i>Andropogon hallii</i>)	2.5	113000
Sand Lovegrass(<i>Eragrostis trichodes</i>)	0.3	1300000
Reed canarygrass(<i>Phalaris arundinacea</i>)	2.0	533000

FORBS	LBS PLS PER ACRE	APPROXIMATE NUMBER OF SEEDS PER LB (PLS)
Purple prairieclover (<i>Petalostemen purpureum</i>)	0.2	278.000
Pitcher Sage		
Salvia pitcheri	0.2	149,000
Upright prairieconeflower	0.1	461,000

Buffalograss lawn: Spring seeding or dormant fall seeding.

BOTANICAL AND COMMON NAME	LBS (PLS) PER ACRE	APPROXIMATE NUMBER OF SEEDS PER POUND
Buffalograss (<i>Buchloe dactyloides</i>)	20.0	52,000
Blue Grama (<i>Bouteloua gracilis</i>)	0.1	825,000

B. Soil Amendments:

C. Asphalt Binder: Emulsified asphalt per State specifications.

D. Water:

1. Water free from substances harmful to grass or sod growth.

PART 3 - EXECUTION

3.1 SOIL PREPARATION

A. General:

1. Limit preparation to areas which will be planted soon after.
2. Provide facilities to protect and safeguard all persons on or about premises.
3. Protect existing trees designated to remain.
4. Verify location and existence of all underground utilities.
 - a. Take necessary precaution to protect existing utilities from damage due to construction activity.
 - b. Repair all damages to utility items at no cost to Owner.
5. Provide facilities such as protective fences and/or watchmen to protect work from vandalism.
 - a. Contractor to be responsible for vandalism until acceptance of work in whole or in part.

B. Preparation for Lawn-Type Seeding, Sprigging, Plugging or Sodding:

1. Loosen surface to minimum depth of 4 IN.
2. Remove stones over 1 IN in any dimension and sticks, roots, rubbish, and other extraneous matter.
3. Prior to applying fertilizer, loosen areas to be seeded with a double disc or other suitable device if the soil has become hard or compacted.
4. Correct any surface irregularities in order to prevent pocket or low areas which will allow water to stand.
5. Distribute fertilizer uniformly over areas to be seeded:
 - a. For lawn-type seeding: 30 LBS per 1000 SF.
 - b. For pasture seeding: 200 LBS per acre.
6. Incorporate fertilizer into soil to a depth of at least 2 IN by disking, harrowing, or other approved methods.
7. Remove stones or other substances from surface which will interfere with turf development or subsequent mowing operations.
8. Grade lawn areas to a smooth, even surface with a loose, uniformly fine texture.
 - a. Roll and rake, remove ridges and fill depressions, as required to meet finish grades.
 - b. Limit fine grading to areas which can be planted soon after preparation.
9. Restore lawn areas to specified condition if eroded or otherwise disturbed after fine grading and before planting.
10. Spread limestone uniformly over designated areas at a rate of 100 LBS per 1000 SF.

11. Distribute fertilizer as specified uniformly over areas to be seeded at a rate of 12 LBS per 1000 SF.

C. Native Grass Seeding:

3.2 INSTALLATION

A. Lawn-Type and Pasture Seeding:

1. Do not use seed which is wet, moldy, or otherwise damaged.
2. Perform seeding work from April 20 to May 15 for spring planting, and August 1 to September 15 for fall planting, unless otherwise approved by Owner's Representative.
3. Employ satisfactory methods of sowing using mechanical power-driven drills or seeders, or mechanical hand seeders, or other approved equipment.
4. Distribute seed evenly over entire area at rate of application not less than 4 LBS (PLS) of seed per 1000 SF, 50 percent sown in one direction, remainder at right angles to first sowing.
5. Stop work when work extends beyond most favorable planting season for species designated, or when satisfactory results cannot be obtained because of drought, high winds excessive moisture, or other factors.
 - a. Resume work only when favorable conditions develop.
6. Lightly rake seed into soil followed by light rolling or cultipacking.
7. Immediately protect seeded areas against erosion by mulching.
 - a. Spread mulch in continuous blanket using 1-1/2 tons per acre to a depth of 4 or 5 straws.
8. Protect seeded slopes against erosion with erosion netting or other methods approved by Owner's Representative.
 - a. Protect seeded areas against traffic or other use by erecting barricades and placing warning signs.
9. Immediately following spreading mulch, anchor mulch using a rolling coulter or a wheatland land packer having wheels with V-shaped edges to force mulch into soil surface, or apply evenly distributed emulsified asphalt at rate of 10-13 GAL/1000 SF.
 - a. SS-1 emulsion in accordance with ASTM D5276 or RC-1 cutback asphalt in accordance with ASTM D2028 are acceptable.
 - b. If mulch and asphalt are applied in one treatment, use SS-1 emulsion with penetration test range between 150-200.
 - c. Use appropriate shields to protect adjacent site improvements.

3.3 PLANTING TREES, SHRUBS, AND GROUND COVERS

A. Notification:

1. Notify Owner's Representative of source of plants and plant materials at least 30 days prior to planting to permit Owner's Representative inspection of source qualifications.

B. Preparation:

1. Handle plants so that roots or balls are adequately protected from breakage of balls, from sun or drying winds.
 - a. Ensure tops or roots of plants are not permitted to dry out.
2. During transportation, protect materials from wind and sun to prevent tops and roots from drying out.
3. Protect tops of plants from damage. Plants with damaged tops will be rejected.
4. For purpose of inspection and planting identification, attach durable, legible labels to bundle or container of plant material delivered at the planting site. State correct plant name and size of each plant in weather-resistant ink on labels.
5. Do not prune trees and shrubs at nursery.

C. Planting Season:

1. Plant deciduous shade trees and shrubs any time the ground is suitable between October 15 and June 1.
2. Plant evergreen material between September 1 and June 1.
3. Plant ground covers between March 15 to June 1.

D. Planting Procedure:

1. Indicate locations of plants for approval by Owner's Representative before excavating plant locations.
2. In event underground construction, utilities, obstructions, or rock are encountered in excavation of plantings, secure alternate locations from Owner's Representative
 - a. Make said changes without additional compensation.
 - b. Where tree locations fall under existing overhead wires, or crowd existing trees, adjust locations as directed by Owner's Representative.
3. Excavate pits and beds as necessary and in accordance with ANLA/ANSI Z60.1.
 - a. Loosen bottom of pits prior to planting.
 - b. Excavation is unclassified; excavate all materials without additional cost.

4. Tree and shrub pits to be circular in shape with vertical sides at least 1 FT greater in diameter than ball diameter.
 - a. Pit to be of sufficient depth to provide 6 IN of planting soil under ball when set to natural grade.
5. Shrub and ground cover beds:
 - a. Plant shrubs used in mass plantings in individual holes of required size.
 - b. Strip all sod from among mass planting.
 - c. For ground cover beds, remove sod from within limits of bed.
 - d. Add soil amendments as specified and mix or rototill with existing topsoil to a depth of 6 IN.
6. Set plants straight or plumb, in locations when indicated and at such level that after settlement they bear same relationship to finished grade as they did in their former setting.
 - a. Carefully tamp planting soil under and around base of balls to prevent voids.
 - b. Remove burlap, rope and wires from top of balls.
 - c. Do not remove burlap from sides and bottom of balls.
7. Backfill plants with planting soil.
 - a. Tamp to 1/2 depth of pit and thoroughly water and puddle before bringing backfill to proper grade.
 - b. After planting has been completed, flood pit again so that backfill is thoroughly saturated and settled.
8. After planting is complete, form a level saucer 3 IN high around each tree extending to limit of plant pit for watering purposes.
9. Mulch plant pit after saucer has been shaped.
 - a. Mulch to limits of pit and uniformly over ground cover beds to a depth of 3 IN.
 - b. In mass plantings of shrubs, mulch entire area uniformly among shrubs to a depth of 3 IN.
 - c. If mulching is delayed and soil has dried out, water plants thoroughly before spreading mulch.
10. Staking: Stake trees immediately after planting as detailed on Drawings or in accordance with Nursery Standards.
11. Wrap deciduous trees 2 IN or more in caliper by neatly overlapping wrapping material between ground line and second branch. Place ties at top and bottom of wrapping material and not more than 12 IN apart between top and bottom ties.

12. Remove dead or damaged branches.
 - a. Thin deciduous material to about two-thirds of initial branching.
 - b. Remove only dead or damaged branches from evergreens.
13. Water plants during planting operations.
 - a. Water each plant a minimum of once each week until final acceptance.
 - b. Apply sufficient water to moisten backfill about each plant so that

3.4 MAINTENANCE AND REPLACEMENT

A. General:

1. Begin maintenance of planted areas immediately after each portion is planted and continue until final acceptance or for a specific time period as stated below, whichever is the longer.
2. Provide and maintain temporary piping, hoses, and watering equipment as required to convey water from water sources and to keep planted areas uniformly moist as required for proper growth.
3. Protection of new materials:
 - a. Provide barricades, coverings or other types of protection necessary to prevent damage to existing improvements indicated to remain.
 - b. Repair and pay for all damaged items.
4. Replace unacceptable materials with materials and methods identical to the original specifications unless otherwise approved by the Owner's Representative.

B. Seeded or Sodded Lawns:

1. Maintain seeded lawns: 90 days, minimum, after installation and review of entire project area to be planted.
2. Maintenance period begins at completion of planting or installation of entire area to be seeded or sodded.
3. Owner's Representative will review seeded or sodded lawn area after installation for initial acceptance.
4. Maintain lawns by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading, and replanting as required to establish a smooth, uniform lawn, free of weeds and eroded or bare areas.
5. Lay out temporary lawn watering system and arrange watering schedule to avoid walking over muddy and newly seeded areas.
 - a. Use equipment and water to prevent puddling and water erosion and displacement of seed or mulch.

6. Mow lawns as soon as there is enough top growth to cut with mower set at recommended height for principal species planted.
 - a. Repeat mowing as required to maintain height.
 - b. Do not delay mowing until grass blades bend over and become matted.
 - c. Do not mow when grass is wet.
 - d. Time initial and subsequent mowings as required to maintain a height of 1-1/2 to 2 IN.
 - e. Do not mow lower than 1-1/2 IN.
7. Remulch with new mulch in areas where mulch has been disturbed by wind or maintenance operations sufficiently to nullify its purpose.
 - a. Anchor as required to prevent displacement.
8. Unacceptable plantings are those areas that do not meet the quality of the specified material, produce the specified results, or were not installed to the specified methods.
9. Replant bare areas using same materials specified.
10. Owner's Representative will review final acceptability of installed areas at end of maintenance period.
11. Maintain repaired areas until remainder of maintenance period or approved by Owner's Representative, whichever is the longer period.

3.5 OWNER TRAINING (NOT USED)

END OF SECTION

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APPENDIX A

GENERATOR SUBMITTAL



**Emergency Power Generator
for
SJRA WWTF 2 New Generator
San Jacinto River Authority**

For questions or comments regarding this submittal, please contact your Cummins Sales and Service Project Manager listed below.

Please return all submittal correspondence to your Project Manager.

Chris Maupin – 972-780-4303
chris.r.maupin@cummins.com

Chris Maupin
Cummins Sales and Service
4855 Mountain Creek Parkway
Dallas, TX 75236

Cummins Sales and Service certifies that these drawings, materials lists, specification and data sheets have been checked prior to submittal and they accurately depict the proposed equipment. Cummins Sales and Service certifies that to the best of our knowledge, the data described in these drawings, materials lists and data sheets is true and correct.

A handwritten signature in black ink that reads 'C Maupin'.

Authorized Signature

Cummins Sales and Service
4855 Mountain Creek Parkway
Dallas, TX 75236
Phone 972-708-0000
cummins-sp.com

DATE: 2/13/2018

PROJECT: SJRA WWTF 2 NEW GENERATOR

CUSTOMER: SAN JACINTO RIVER AUTHORITY

TABLE OF CONTENTS

MATERIALS LIST

Materials List

(1) Cummins/Onan Model 1500DQGAB Generator Set
(1) Sizing Report

ENGINE/GENERATOR SECTION

S-1512
D-3334k
S-1444
ADS-332
EPA-1093o
MCP-152b
MSP-1034c
500-4357
500-4537
320-2164
R Frame Breaker
E&CA

Generator Set Spec Sheet
Generator Data Sheet
PowerCommand® System PCC 3201
Alternator Data Sheet
EPA Exhaust Emissions Compliance Statement
Cooling System Data
Sound Data
Outline – Gen Set
Outline – Circuit Breaker
Circuit Breaker
Ratings & Trip Units/Curves
Enclosure, Fuel Tank, Platforms

INSTALLATION ACCESSORY SECTION

E0157
402-0427
AC-160e
NAAC-5602-EN
S-1433
CSPL

CSPL
A058F886

Interconnect Drawing PCC 3201
Vibration Isolator
Ground Fault Indication Relay (H667)
Battery Charger (10A)
Network Communications Module PCC3201
Instruction of Operations and Maintenance Personnel –
Generator
Generator Installation Pre-Start Up Checklist
Warranty Statement – Gen Set

Materials List

Quotation

CUMMINS SOUTHERN PLAINS, LLC
7045 North Loop East
Houston TX 77028 United States
Direct: 713-679-7759
January 23, 2019

Project Name: SJRA WWTF 2 New Generator - (O-73957)

Quotation: 2581000000166963

Thank you for your inquiry. We are pleased to quote as follows:

		USD
Item	Description	Qty
E&CA	Aluminum Weather enclosure, lighting, & packaging	1
E&CA	platforms	1
E&CA	7180 gal subbase tank	1
Diesel Genset: 60Hz-1500/1350kW		
Install-US-Stat	U.S. EPA, Stationary Emergency Application	1
1500DQGAB	Genset-Diesel,60Hz,1500kW	1
A331-2	Duty Rating-Standby Power	1
L090-2	Listing-UL 2200	1
L170-2	Emissions Certification, EPA, Tier 2, NSPS CI Stationary Emergency	1
R002-2	Voltage-277/480,3 Phase,Wye,4 Wire	1
B600-2	Alternator-60Hz,3Ph,480V,105/80C-SP	1
H611-2	Generator Set Control-PCC 3201	1
H536-2	Display Language-English	1
A362-2	Heater-Control Cabinet,120VAC	1
H605-2	Display-Control,Graphical	1
H606-2	Meters-AC Output,Analog	1
K911-2	Shutdown Alarm Relay-3 Pole Double Throw	1
KA08-2	Alarm-Audible, Engine Shutdown	1
KP60-2	Interface-Communications Network, FTT-10	1
H608-2	Control Mounting-Right Facing	1
A292-2	Heater-Alternator, 120 Volt AC	1
KP79-2	Circuit Breaker Or Entrance Box-Left Side Only	1
KP83-2	CB-2500A,3P,600/690V,UL/IEC,ServEnt,100%UL,Left	1

H667-2	Indication-Ground Fault, 4-Pole XfrSw&Ckt Brkr, LS	1
C127-2	Separator-Fuel/Water	1
A334-2	Engine Starter-24 VDC Motor	1
A333-2	Battery Charging Alternator-Normal Output	1
E125-2	Engine Cooling-High Ambient Air Temperature	1
H389-2	Shutdown-Low Coolant Level	1
H556-2	Coolant Heater-208/240/480V, 40F Minimum Ambient Temp	1
D041-2	Engine Air Cleaner-Normal Duty	1
H607-2	Filters-Engine Oil, Full Flow and Bypass	1
L189-2	ST 5YR 2500HR Parts + Labor + Travel	1
L050-2	Literature-English	1
A358-2	Packing-None	1
CP01-2	Common Parts Listing	1
SPEC-C	Product Revision-C	1
A051H785	Battery Charger 12/24 VDC 20 AMP 50/60 Hz 120/208/240 VAC	1
	stainless steel valves and drain extensions	1
Level I Walk Through Training	System Instruction for Site Personnel by Field Technician	4
Genset Freight	Generator Freight	20
Load Bank Charge	Resistive, Transportation, Set-Up & Operation	1500
Battery - SAE 8D	12 Volt, Lead Acid	4
Start-Up	System Check & Inspection	32
Load Bank-Site Testing Resistive	_ Hour Resistive Load Bank, with written record	8
Mileage	Start Up-Travel to and from Job Site	350
Manual	Maintenance, Operations, Installation & Parts	2



Recommended Generator Report - 1500DQGAB*

Project - Copy of SJRA WWTF 2 Rev2

Comments -

Project Requirements

Frequency, Hz	: 60.0	Generators Running in Parallel	: 1
Duty	: Standby	Site Altitude, ft(m)	: 361(152)
Voltage	: 277/480, Series Wye	Site Temperature, °C	: 25
Phase	: 3	Max. Altr Temp Rise, °C	: 125
Fuel	: Diesel	Project Voltage Distortion Limit, %	: 10
Emissions	: EPA, stationary emergency application		

Calculated Individual Generator Set Load Running and Peak Requirements

Running kW	: 1226.3	Max. Step kW	: 367.6 In Step 15	Cumulative Step kW	: 1411.8
Running kVA	: 1390.5	Max. Step kVA	: 690.6 In Step 15	Cumulative Step kVA	: 1877.7
Running PF	: 0.88	Peak kW	: None	Cumulative Peak kW	: None
Running NLL kVA	: 352.7	Peak kVA	: None	Cumulative Peak kVA	: None
Alternator kW	: 1543.79			Pct Rated Capacity	: 81.7

Generator Set Configuration

Alternator	: P734C	Engine	: QSK50-G4 NR2
BCode	: B276	Fuel	: Diesel
Excitation	: PMG	Displacement, cu in. (Litre)	: 3069.0(50.3)
Voltage Range	: LimRHY 480	Cylinders	: 16
Number of Leads	: 6	Altitude Knee, ft(m)	: 3569(1088)
Reconnectable	: Yes	Altitude Slope, % per 1000ft(304.8m)	: 7
Full Single Phase Output	: No	Temperature Knee, °F(°C)	: 104(40)
Increased Motor Starting	: No	Temperature Slope, % per 18°F(10.0°C)	: 14
Extended Stack	: No	Emissions	: EPA Tier 2
		Cooling Package	: high ambient

Set Performance

Load Requirements

Running At	: 81.7% Rated Capacity		
Max. Step Voltage Dip, %	: 8	Max. Allowed Step Voltage Dip	: 20 In Step 15
Max. Step Frequency Dip, %	: 3	Max. Allowed Step Frequency Dip	: 10 In Step 15
Peak Voltage Dip, %	:	Peak Voltage Dip Limit %	: 20.0
Peak Frequency Dip, %	:	Peak Frequency Dip Limit %	: 10
Site Rated Standby kW/kVA	: 1500 / 1875	Running kW	: 1226.3
		Running kVA	: 1390.5
Site Rated Max. SkW	: 1525	Effective Step kW	: 1143.6
Max. SkVA	: 5521	Effective Step kVA	: 1877.7
Temp Rise at Full Load, °C	: 125	Percent Non-Linear Load	: 26.0
Voltage Distortion	: 5.2	Voltage Distortion Limit	: 10
Site Rated Max Step kW Limit	:	Max Step kW	:

*Note: Higher temperature rise at full rated load.

*Note: All generator set power derates are based on open generator sets.



Loads Summary Report

Project - Copy of SJRA WWTF 2 Rev2

Comments -

Project Requirements

Frequency, Hz	: 60.0	Generators Running in Parallel	: 1
Duty	: Standby	Site Altitude, ft(m)	: 361(152)
Voltage	: 277/480, Series Wye	Site Temperature, °C	: 25
Phase	: 3	Max. Altr Temp Rise, °C	: 125
Fuel	: Diesel	Project Voltage Distortion Limit, %	: 10
Emissions	: EPA, stationary emergency application		

Loads Summary List

***Note: Detailed Loads and Step Report available below**

Step No.	Load Name	Quantity	Running		Starting		Peak		Dip Limits, %		VTHD% Limit
			kW	kVA	kW	kVA	kW	kVA	Vdip	Fdip	
Step01	Transformer - Electric Bldg Low Voltage	1	60.0	75.0	60.0	75.0	None	None	20.0	10.0	0.0
Step Summary			60.0	75.0	60.0	75.0	None	None	20.0	10.0	0.0
Step02	Transformer - Office Bldg Low Voltage	1	40.0	50.0	40.0	50.0	None	None	20.0	10.0	0.0
Step Summary			40.0	50.0	40.0	50.0	None	None	20.0	10.0	0.0
Step03	Transformer - Blower Bldg	1	8.0	10.0	8.0	10.0	None	None	20.0	10.0	0.0
Step Summary			8.0	10.0	8.0	10.0	None	None	20.0	10.0	0.0
Step04	Transformer - Storage Bldg Low Voltage	1	16.0	20.0	16.0	20.0	None	None	20.0	10.0	0.0
Step Summary			16.0	20.0	16.0	20.0	None	None	20.0	10.0	0.0
Step05	Transformer - RAS1 Bldg	1	8.0	10.0	8.0	10.0	None	None	20.0	10.0	0.0
Step Summary			8.0	10.0	8.0	10.0	None	None	20.0	10.0	0.0
Step06	Transformer - RAS2 Bldg	1	8.0	10.0	8.0	10.0	None	None	20.0	10.0	0.0
Step Summary			8.0	10.0	8.0	10.0	None	None	20.0	10.0	0.0
Step07	Transformer - Disinfecting Bldg	1	30.0	37.5	30.0	37.5	None	None	20.0	10.0	0.0
Step Summary			30.0	38.0	30.0	38.0	None	None	20.0	10.0	0.0
Step08	Transformer - Beltpress Bldg	1	40.0	50.0	40.0	50.0	None	None	20.0	10.0	0.0
Step Summary			40.0	50.0	40.0	50.0	None	None	20.0	10.0	0.0
Step09	Aeration Blowers - 150hp	1	122.97	135.13	151.35	540.52	None	None	20.0	10.0	10.0

Step Summary			123.0	135.0	151.0	541.0	None	None	20.0	10.0	10.0
Step10	Aeration Blowers - 150hp	1	122.97	135.13	151.35	540.52	None	None	20.0	10.0	10.0
Step Summary			123.0	135.0	151.0	541.0	None	None	20.0	10.0	10.0
Step11	Aeration Blowers - 150hp	1	122.97	135.13	151.35	540.52	None	None	20.0	10.0	10.0
Step Summary			123.0	135.0	151.0	541.0	None	None	20.0	10.0	10.0
Step12	Aeration Blowers - 150hp	1	122.97	135.13	151.35	540.52	None	None	20.0	10.0	10.0
Step Summary			123.0	135.0	151.0	541.0	None	None	20.0	10.0	10.0
Step13	Lift Pumps - 70hp	3	58.02	64.47	58.02	64.47	None	None	20.0	10.0	10.0
Step13	RAS1 Return Pump - 40hp	2	33.16	36.84	33.16	36.84	None	None	20.0	10.0	10.0
Step13	RAS1 Waste Pump - 10hp	1	8.67	9.97	35.51	67.0	None	None	20.0	10.0	0.0
Step13	Clarifier Drive 1 & 2 - 1hp	2	1.02	1.46	8.97	11.8	None	None	20.0	10.0	0.0
Step13	Grit Classifier - 1hp	1	1.02	1.46	8.97	11.8	None	None	20.0	10.0	0.0
Step13	Grit Pumps - 10hp	1	8.67	9.97	35.51	67.0	None	None	20.0	10.0	0.0
Step Summary			261.0	291.0	338.0	436.0	None	None	20.0	10.0	10.0
Step14	RAS2 Return Pump - 10hp	1	8.29	9.21	8.29	9.21	None	None	20.0	10.0	10.0
Step14	RAS2 Waste Pump - 5hp	1	4.14	4.6	4.14	4.6	None	None	20.0	10.0	10.0
Step14	Clarifier Drive 3 - 1hp	1	1.02	1.46	8.97	11.8	None	None	20.0	10.0	0.0
Step14	Process Water Pumps - 30hp	1	24.87	27.63	24.87	27.63	None	None	20.0	10.0	10.0
Step14	Aqua diamond filter	1	16.58	18.42	16.58	18.42	None	None	20.0	10.0	10.0
Step14	sand filters backwash pump - 5hp	6	4.44	5.22	22.88	37.5	None	None	20.0	10.0	0.0
Step Summary			82.0	93.0	200.0	297.0	None	None	20.0	10.0	10.0
Step15	Disinfecting Bldg Unit Heaters - 10kW	5	10.0	10.53	10.0	10.53	None	None	20.0	10.0	0.0
Step15	CL2 Scum Pumps - 5hp	2	4.44	5.22	22.88	37.5	None	None	20.0	10.0	0.0
Step15	CL2 Scrubbers - 25hp	2	21.19	23.81	64.9	147.5	None	None	20.0	10.0	0.0
Step15	Exhaust Fans - 10hp	4	8.67	9.97	35.51	67.0	None	None	20.0	10.0	0.0
Step Summary			136.0	151.0	368.0	691.0	None	None	20.0	10.0	10.0
Step16	Beltpress 1 - 10hp	1	8.67	9.97	35.51	67.0	None	None	20.0	10.0	0.0
Step16	Thickener Drive - 1hp	1	1.02	1.46	8.97	11.8	None	None	20.0	10.0	0.0
Step16	Scum Pump - 5hp	1	4.44	5.22	22.88	37.5	None	None	20.0	10.0	0.0
Step16	Thickening Sludge Pump - 7.5hp	2	6.21	6.9	6.21	6.9	None	None	20.0	10.0	10.0
Step16	Beltpress 2 - 10hp	1	8.29	9.21	8.29	9.21	None	None	20.0	10.0	10.0
Step16	Beltpress Conveyors - 5hp	2	4.44	5.22	22.88	37.5	None	None	20.0	10.0	0.0
Step16	hubber and mahr screen	2	1.24	1.38	1.24	1.38	None	None	20.0	10.0	10.0
Step Summary			46.0	53.0	136.0	217.0	None	None	20.0	10.0	10.0

Project Summary	Running		Max Starting		Cumulative Step		Cumulative Peak		Project VTHD% Limit
	kW	kVA	kW	kVA	kW	kVA	kW	kVA	
	1226.3	1390.5	367.6	690.6	1411.8	1877.7	0.0	0.0	10.0

***Note: Detailed Loads and Step Report available below**



Loads and Steps Detail Report

Project - Copy of SJRA WWTF 2 Rev2

Comments -

Project Requirements

Frequency, Hz	: 60.0	Generators Running in Parallel	: 1
Duty	: Standby	Site Altitude, ft(m)	: 361(152)
Voltage	: 277/480, Series Wye	Site Temperature, °C	: 25
Phase	: 3	Max. Altr Temp Rise, °C	: 125
Fuel	: Diesel	Project Voltage Distortion Limit, %	: 10
Emissions	: EPA, stationary emergency application		

Calculated Individual Generator Set Load Running and Peak Requirements

Running kW	: 1226.3	Max. Step kW	: 367.6 In Step 15	Cumulative Step kW	: 1411.8
Running kVA	: 1390.5	Max. Step kVA	: 690.6 In Step 15	Cumulative Step kVA	: 1877.7
Running PF	: 0.88	Peak kW	: None	Cumulative Peak kW	: None
Running NLL kVA	: 352.7	Peak kVA	: None	Cumulative Peak kVA	: None
Alternator kW	: 1543.79				

Step1

Calculated Individual Generator Set Step Load Requirements

Running kW	: 60.0	Starting kW	: 60.0	Cumulative Step kW	: 60.0
Running kVA	: 75.0	Starting kVA	: 75.0	Cumulative Step kVA	: 75.0
Running Amps	: 90.0	Starting Non-linear kVA	: 0.0		
Running Non-linear kVA	: 0.0				
Alternator kW	: 60.0				
Voltage Distortion Limit for step	: 0				

Transformer - Electric Bldg Low Voltage	Single Phase	Quantity	: 1 In this Step
Category	: User Defined		

Running kW	: 60.0	Starting kW	: 60.0	Peak kW	: None
Running kVA	: 75.0	Starting kVA	: 75.0	Peak kVA	: None
Running PF	: 0.8	Starting PF	: 0.8	Cyclic	: No
Running Amps	: 156.25	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Alternator kW	: 60.0			Voltage	: 480

Step2

Calculated Individual Generator Set Step Load Requirements

Running kW	: 40.0	Starting kW	: 40.0	Cumulative Step kW	: 100.0
Running kVA	: 50.0	Starting kVA	: 50.0	Cumulative Step kVA	: 125.0
Running Amps	: 60.0	Starting Non-linear kVA	: 0.0		

Running Non-linear kVA : 0.0
 Alternator kW : 40.0
 Voltage Distortion Limit for step : 0

Transformer - Office Bldg Low Voltage Three Phase Quantity : 1 In this Step
 Category : User Defined

Running kW	: 40.0	Starting kW	: 40.0	Peak kW	: None
Running kVA	: 50.0	Starting kVA	: 50.0	Peak kVA	: None
Running PF	: 0.8	Starting PF	: 0.8	Cyclic	: No
Running Amps	: 60.21	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Alternator kW	: 40.0			Voltage	: 480

Step3

Calculated Individual Generator Set Step Load Requirements

Running kW	: 8.0	Starting kW	: 8.0	Cumulative Step kW	: 108.0
Running kVA	: 10.0	Starting kVA	: 10.0	Cumulative Step kVA	: 135.0
Running Amps	: 12.0	Starting Non-linear kVA	: 0.0		
Running Non-linear kVA	: 0.0				
Alternator kW	: 8.0				
Voltage Distortion Limit for step	: 0				

Transformer - Blower Bldg Single Phase Quantity : 1 In this Step
 Category : User Defined

Running kW	: 8.0	Starting kW	: 8.0	Peak kW	: None
Running kVA	: 10.0	Starting kVA	: 10.0	Peak kVA	: None
Running PF	: 0.8	Starting PF	: 0.8	Cyclic	: No
Running Amps	: 20.83	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Alternator kW	: 8.0			Voltage	: 480

Step4

Calculated Individual Generator Set Step Load Requirements

Running kW	: 16.0	Starting kW	: 16.0	Cumulative Step kW	: 124.0
Running kVA	: 20.0	Starting kVA	: 20.0	Cumulative Step kVA	: 155.0
Running Amps	: 24.0	Starting Non-linear kVA	: 0.0		
Running Non-linear kVA	: 0.0				
Alternator kW	: 16.0				
Voltage Distortion Limit for step	: 0				

Transformer - Storage Bldg Low Voltage Single Phase Quantity : 1 In this Step
 Category : User Defined

Running kW	: 16.0	Starting kW	: 16.0	Peak kW	: None
Running kVA	: 20.0	Starting kVA	: 20.0	Peak kVA	: None
Running PF	: 0.8	Starting PF	: 0.8	Cyclic	: No
Running Amps	: 41.67	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Alternator kW	: 16.0			Voltage	: 480

Step5

Calculated Individual Generator Set Step Load Requirements

Running kW	: 8.0	Starting kW	: 8.0	Cumulative Step kW	: 132.0
Running kVA	: 10.0	Starting kVA	: 10.0	Cumulative Step kVA	: 165.0
Running Amps	: 12.0	Starting Non-linear kVA	: 0.0		
Running Non-linear kVA	: 0.0				
Alternator kW	: 8.0				
Voltage Distortion Limit for step	: 0				

Transformer - RAS1 Bldg	Single Phase	Quantity	: 1 In this Step
Category	: User Defined		

Running kW	: 8.0	Starting kW	: 8.0	Peak kW	: None
Running kVA	: 10.0	Starting kVA	: 10.0	Peak kVA	: None
Running PF	: 0.8	Starting PF	: 0.8	Cyclic	: No
Running Amps	: 20.83	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Alternator kW	: 8.0			Voltage	: 480

Step6

Calculated Individual Generator Set Step Load Requirements

Running kW	: 8.0	Starting kW	: 8.0	Cumulative Step kW	: 140.0
Running kVA	: 10.0	Starting kVA	: 10.0	Cumulative Step kVA	: 175.0
Running Amps	: 12.0	Starting Non-linear kVA	: 0.0		
Running Non-linear kVA	: 0.0				
Alternator kW	: 8.0				
Voltage Distortion Limit for step	: 0				

Transformer - RAS2 Bldg	Single Phase	Quantity	: 1 In this Step
Category	: User Defined		

Running kW	: 8.0	Starting kW	: 8.0	Peak kW	: None
Running kVA	: 10.0	Starting kVA	: 10.0	Peak kVA	: None
Running PF	: 0.8	Starting PF	: 0.8	Cyclic	: No
Running Amps	: 20.83	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Alternator kW	: 8.0			Voltage	: 480

Step7

Calculated Individual Generator Set Step Load Requirements

Running kW	: 30.0	Starting kW	: 30.0	Cumulative Step kW	: 170.0
Running kVA	: 38.0	Starting kVA	: 38.0	Cumulative Step kVA	: 213.0
Running Amps	: 45.0	Starting Non-linear kVA	: 0.0		
Running Non-linear kVA	: 0.0				
Alternator kW	: 30.0				
Voltage Distortion Limit for step	: 0				

Transformer - Disinfecting Bldg	Single Phase	Quantity	: 1 In this Step
Category	: User Defined		

Running kW	: 30.0	Starting kW	: 30.0	Peak kW	: None
Running kVA	: 37.5	Starting kVA	: 37.5	Peak kVA	: None
Running PF	: 0.8	Starting PF	: 0.8	Cyclic	: No
Running Amps	: 78.12	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Alternator kW	: 30.0			Voltage	: 480

Step8

Calculated Individual Generator Set Step Load Requirements

Running kW	: 40.0	Starting kW	: 40.0	Cumulative Step kW	: 210.0
Running kVA	: 50.0	Starting kVA	: 50.0	Cumulative Step kVA	: 263.0
Running Amps	: 60.0	Starting Non-linear kVA	: 0.0		
Running Non-linear kVA	: 0.0				
Alternator kW	: 40.0				
Voltage Distortion Limit for step	: 0				

Transformer - Beltpress Bldg	Single Phase	Quantity	: 1 In this Step
Category	: User Defined		

Running kW	: 40.0	Starting kW	: 40.0	Peak kW	: None
Running kVA	: 50.0	Starting kVA	: 50.0	Peak kVA	: None
Running PF	: 0.8	Starting PF	: 0.8	Cyclic	: No
Running Amps	: 104.17	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Alternator kW	: 40.0			Voltage	: 480

Step9

Calculated Individual Generator Set Step Load Requirements

Running kW	: 123.0	Starting kW	: 151.0	Cumulative Step kW	: 361.0
Running kVA	: 135.0	Starting kVA	: 541.0	Cumulative Step kVA	: 803.0
Running Amps	: 163.0	Starting Non-linear kVA	: 541.0		
Running Non-linear kVA	: 0.0				
Alternator kW	: 122.97				
Voltage Distortion Limit for step	: 10				

Aeration Blowers - 150hp	Three Phase	Quantity	: 1 In this Step
Category	: Motor		

Running kW	: 122.97	Starting kW	: 151.35	Peak kW	: None
Running kVA	: 135.13	Starting kVA	: 540.52	Peak kVA	: None
Running PF	: 0.91	Starting PF	: 0.28	Cyclic	: No
Running Amps	: 162.73	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Running NLL kVA	: 0.0				
Starting NLL kVA	: 540.52			Voltage	: 480
Alternator kW	: 122.97				

Shaft Hp	: 150.0	Method	: Solid State
Shaft kW	: 111.9	Current Limit	: 400.0
Efficiency (%)	: 0.91	LRkVA Factor	: 5.9
Design	: Standard NEMA Design B,C or D	LRkVA Code	: G

Rectifier Type	: 6 pulse	THDI %	: 26
		THDV %	: 10

Load Factor : 100.0

Step10

Calculated Individual Generator Set Step Load Requirements

Running kW	: 123.0	Starting kW	: 151.0	Cumulative Step kW	: 484.0
Running kVA	: 135.0	Starting kVA	: 541.0	Cumulative Step kVA	: 938.0
Running Amps	: 163.0	Starting Non-linear kVA	: 541.0		
Running Non-linear kVA	: 0.0				
Alternator kW	: 122.97				
Voltage Distortion Limit for step	: 10				

Aeration Blowers - 150hp	Three Phase	Quantity	: 1 In this Step
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Category : Motor

Running kW	: 122.97	Starting kW	: 151.35	Peak kW	: None
Running kVA	: 135.13	Starting kVA	: 540.52	Peak kVA	: None
Running PF	: 0.91	Starting PF	: 0.28	Cyclic	: No
Running Amps	: 162.73	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Running NLL kVA	: 0.0				
Starting NLL kVA	: 540.52			Voltage	: 480
Alternator kW	: 122.97				

Shaft Hp	: 150.0	Method	: Solid State
Shaft kW	: 111.9	Current Limit	: 400.0
Efficiency (%)	: 0.91	LRkVA Factor	: 5.9
Design	: Standard NEMA Design B,C or D	LRkVA Code	: G
Rectifier Type	: 6 pulse	THDI %	: 26
		THDV %	: 10

Load Factor : 100.0

Step11

Calculated Individual Generator Set Step Load Requirements

Running kW	: 123.0	Starting kW	: 151.0	Cumulative Step kW	: 607.0
Running kVA	: 135.0	Starting kVA	: 541.0	Cumulative Step kVA	: 1073.0
Running Amps	: 163.0	Starting Non-linear kVA	: 541.0		
Running Non-linear kVA	: 0.0				
Alternator kW	: 122.97				
Voltage Distortion Limit for step	: 10				

Aeration Blowers - 150hp	Three Phase	Quantity	: 1 In this Step
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Category : Motor

Running kW	: 122.97	Starting kW	: 151.35	Peak kW	: None
Running kVA	: 135.13	Starting kVA	: 540.52	Peak kVA	: None
Running PF	: 0.91	Starting PF	: 0.28	Cyclic	: No
Running Amps	: 162.73	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Running NLL kVA	: 0.0				

Starting NLL kVA	: 540.52	Voltage	: 480
Alternator kW	: 122.97		
Shaft Hp	: 150.0	Method	: Solid State
Shaft kW	: 111.9	Current Limit	: 400.0
Efficiency (%)	: 0.91	LRkVA Factor	: 5.9
Design	: Standard NEMA Design B,C or D	LRkVA Code	: G
Rectifier Type	: 6 pulse	THDI %	: 26
		THDV %	: 10
Load Factor	: 100.0		

Step12

Calculated Individual Generator Set Step Load Requirements

Running kW	: 123.0	Starting kW	: 151.0	Cumulative Step kW	: 730.0
Running kVA	: 135.0	Starting kVA	: 541.0	Cumulative Step kVA	: 1208.0
Running Amps	: 163.0	Starting Non-linear kVA	: 541.0		
Running Non-linear kVA	: 0.0				
Alternator kW	: 122.97				
Voltage Distortion Limit for step	: 10				

Aeration Blowers - 150hp	Three Phase	Quantity	: 1 In this Step
Category	: Motor		

Running kW	: 122.97	Starting kW	: 151.35	Peak kW	: None
Running kVA	: 135.13	Starting kVA	: 540.52	Peak kVA	: None
Running PF	: 0.91	Starting PF	: 0.28	Cyclic	: No
Running Amps	: 162.73	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Running NLL kVA	: 0.0				
Starting NLL kVA	: 540.52			Voltage	: 480
Alternator kW	: 122.97				
Shaft Hp	: 150.0	Method	: Solid State		
Shaft kW	: 111.9	Current Limit	: 400.0		
Efficiency (%)	: 0.91	LRkVA Factor	: 5.9		
Design	: Standard NEMA Design B,C or D	LRkVA Code	: G		
Rectifier Type	: 6 pulse	THDI %	: 26		
		THDV %	: 10		
Load Factor	: 100.0				

Step13

Calculated Individual Generator Set Step Load Requirements

Running kW	: 261.0	Starting kW	: 338.0	Cumulative Step kW	: 1040.0
Running kVA	: 291.0	Starting kVA	: 436.0	Cumulative Step kVA	: 1240.0
Running Amps	: 351.0	Starting Non-linear kVA	: 267.0		
Running Non-linear kVA	: 267.0				
Alternator kW	: 501.16				
Voltage Distortion Limit for step	: 10				

Lift Pumps - 70hp	Three Phase	Quantity	: 3 In this Step
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Category		: Motor			
Running kW	: 58.02	Starting kW	: 58.02	Peak kW	: None
Running kVA	: 64.47	Starting kVA	: 64.47	Peak kVA	: None
Running PF	: 0.9	Starting PF	: 0.9	Cyclic	: No
Running Amps	: 77.64	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Running NLL kVA	: 64.47				
Starting NLL kVA	: 64.47			Voltage	: 480
Alternator kW	: 116.04				
Shaft Hp	: 70.0	Type	: Variable Frequency Drive		
Shaft kW	: 52.22	Ramp Details	: None		
Rectifier Type	: 6 pulse	THDI %	: 26		
Efficiency (%)	: 0.9	THDV %	: 10		
Load Factor	: 100.0				
RAS1 Return Pump - 40hp		Three Phase	Quantity	: 2 In this Step	
Category		: Motor			
Running kW	: 33.16	Starting kW	: 33.16	Peak kW	: None
Running kVA	: 36.84	Starting kVA	: 36.84	Peak kVA	: None
Running PF	: 0.9	Starting PF	: 0.9	Cyclic	: No
Running Amps	: 44.36	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Running NLL kVA	: 36.84				
Starting NLL kVA	: 36.84			Voltage	: 480
Alternator kW	: 66.32				
Shaft Hp	: 40.0	Type	: Variable Frequency Drive		
Shaft kW	: 29.84	Ramp Details	: None		
Rectifier Type	: 6 pulse	THDI %	: 26		
Efficiency (%)	: 0.9	THDV %	: 10		
Load Factor	: 100.0				
RAS1 Waste Pump - 10hp		Three Phase	Quantity	: 1 In this Step	
Category		: Motor			
Running kW	: 8.67	Starting kW	: 35.51	Peak kW	: None
Running kVA	: 9.97	Starting kVA	: 67.0	Peak kVA	: None
Running PF	: 0.87	Starting PF	: 0.53	Cyclic	: No
Running Amps	: 12.01	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Alternator kW	: 8.67			Voltage	: 480
Shaft Hp	: 10.0	Method	: Across the line		
Shaft kW	: 7.46	Low Inertia	: No		
Efficiency (%)	: 0.86	LRkVA Factor	: 6.7		
Design	: Standard NEMA Design B,C or D	LRkVA Code	: H		
Load Factor	: 100.0				
Clarifier Drive 1 & 2 - 1hp		Three Phase	Quantity	: 2 In this Step	
Category		: Motor			
Running kW	: 1.02	Starting kW	: 8.97	Peak kW	: None
Running kVA	: 1.46	Starting kVA	: 11.8	Peak kVA	: None

Running PF	: 0.7	Starting PF	: 0.76	Cyclic	: No
Running Amps	: 1.76	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Alternator kW	: 1.02			Voltage	: 480
Shaft Hp	: 1.0	Method	: Across the line		
Shaft kW	: 0.75	Low Inertia	: No		
Efficiency (%)	: 0.73	LRkVA Factor	: 11.8		
Design	: Standard NEMA Design B,C or D	LRkVA Code	: N		
Load Factor	: 100.0				

Grit Classifier - 1hp	Three Phase	Quantity	: 1 In this Step
Category	: Motor		

Running kW	: 1.02	Starting kW	: 8.97	Peak kW	: None
Running kVA	: 1.46	Starting kVA	: 11.8	Peak kVA	: None
Running PF	: 0.7	Starting PF	: 0.76	Cyclic	: No
Running Amps	: 1.76	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Alternator kW	: 1.02			Voltage	: 480
Shaft Hp	: 1.0	Method	: Across the line		
Shaft kW	: 0.75	Low Inertia	: No		
Efficiency (%)	: 0.73	LRkVA Factor	: 11.8		
Design	: Standard NEMA Design B,C or D	LRkVA Code	: N		
Load Factor	: 100.0				

Grit Pumps - 10hp	Three Phase	Quantity	: 1 In this Step
Category	: Motor		

Running kW	: 8.67	Starting kW	: 35.51	Peak kW	: None
Running kVA	: 9.97	Starting kVA	: 67.0	Peak kVA	: None
Running PF	: 0.87	Starting PF	: 0.53	Cyclic	: No
Running Amps	: 12.01	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Alternator kW	: 8.67			Voltage	: 480
Shaft Hp	: 10.0	Method	: Across the line		
Shaft kW	: 7.46	Low Inertia	: No		
Efficiency (%)	: 0.86	LRkVA Factor	: 6.7		
Design	: Standard NEMA Design B,C or D	LRkVA Code	: H		
Load Factor	: 100.0				

Step14

Calculated Individual Generator Set Step Load Requirements

Running kW	: 82.0	Starting kW	: 200.0	Cumulative Step kW	: 1163.0
Running kVA	: 93.0	Starting kVA	: 297.0	Cumulative Step kVA	: 1391.0
Running Amps	: 112.0	Starting Non-linear kVA	: 60.0		
Running Non-linear kVA	: 60.0				
Alternator kW	: 135.42				
Voltage Distortion Limit for step	: 10				

RAS2 Return Pump - 10hp	Three Phase	Quantity	: 1 In this Step
Category	: Motor		

Running kW	: 8.29	Starting kW	: 8.29	Peak kW	: None
Running kVA	: 9.21	Starting kVA	: 9.21	Peak kVA	: None
Running PF	: 0.9	Starting PF	: 0.9	Cyclic	: No
Running Amps	: 11.09	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Running NLL kVA	: 9.21				
Starting NLL kVA	: 9.21			Voltage	: 480
Alternator kW	: 16.58				
Shaft Hp	: 10.0	Type	: Variable Frequency Drive		
Shaft kW	: 7.46	Ramp Details	: None		
Rectifier Type	: 6 pulse	THDI %	: 26		
Efficiency (%)	: 0.9	THDV %	: 10		
Load Factor	: 100.0				
<hr/>					
RAS2 Waste Pump - 5hp		Three Phase	Quantity	: 1 In this Step	
Category	: Motor				
<hr/>					
Running kW	: 4.14	Starting kW	: 4.14	Peak kW	: None
Running kVA	: 4.6	Starting kVA	: 4.6	Peak kVA	: None
Running PF	: 0.9	Starting PF	: 0.9	Cyclic	: No
Running Amps	: 5.54	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Running NLL kVA	: 4.6				
Starting NLL kVA	: 4.6			Voltage	: 480
Alternator kW	: 8.28				
Shaft Hp	: 5.0	Type	: Variable Frequency Drive		
Shaft kW	: 3.73	Ramp Details	: None		
Rectifier Type	: 6 pulse	THDI %	: 26		
Efficiency (%)	: 0.9	THDV %	: 10		
Load Factor	: 100.0				
<hr/>					
Clarifier Drive 3 - 1hp		Three Phase	Quantity	: 1 In this Step	
Category	: Motor				
<hr/>					
Running kW	: 1.02	Starting kW	: 8.97	Peak kW	: None
Running kVA	: 1.46	Starting kVA	: 11.8	Peak kVA	: None
Running PF	: 0.7	Starting PF	: 0.76	Cyclic	: No
Running Amps	: 1.76	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Alternator kW	: 1.02			Voltage	: 480
Shaft Hp	: 1.0	Method	: Across the line		
Shaft kW	: 0.75	Low Inertia	: No		
Efficiency (%)	: 0.73	LRkVA Factor	: 11.8		
Design	: Standard NEMA Design B,C or D	LRkVA Code	: N		
Load Factor	: 100.0				
<hr/>					
Process Water Pumps - 30hp		Three Phase	Quantity	: 1 In this Step	
Category	: Motor				
<hr/>					
Running kW	: 24.87	Starting kW	: 24.87	Peak kW	: None
Running kVA	: 27.63	Starting kVA	: 27.63	Peak kVA	: None
Running PF	: 0.9	Starting PF	: 0.9	Cyclic	: No

Running Amps	: 33.27	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Running NLL kVA	: 27.63				
Starting NLL kVA	: 27.63			Voltage	: 480
Alternator kW	: 49.74				
Shaft Hp	: 30.0	Type	: Variable Frequency Drive		
Shaft kW	: 22.38	Ramp Details	: None		
Rectifier Type	: 6 pulse	THDI %	: 26		
Efficiency (%)	: 0.9	THDV %	: 10		
Load Factor	: 100.0				
<hr/>					
Aqua diamond filter		Three Phase	Quantity	: 1 In this Step	
Category	: Motor				
<hr/>					
Running kW	: 16.58	Starting kW	: 16.58	Peak kW	: None
Running kVA	: 18.42	Starting kVA	: 18.42	Peak kVA	: None
Running PF	: 0.9	Starting PF	: 0.9	Cyclic	: No
Running Amps	: 22.18	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Running NLL kVA	: 18.42				
Starting NLL kVA	: 18.42			Voltage	: 480
Alternator kW	: 33.16				
Shaft Hp	: 20.0	Type	: Variable Frequency Drive		
Shaft kW	: 14.92	Ramp Details	: None		
Rectifier Type	: 6 pulse	THDI %	: 26		
Efficiency (%)	: 0.9	THDV %	: 10		
Load Factor	: 100.0				
<hr/>					
sand filters backwash pump - 5hp		Three Phase	Quantity	: 6 In this Step	
Category	: Motor				
<hr/>					
Running kW	: 4.44	Starting kW	: 22.88	Peak kW	: None
Running kVA	: 5.22	Starting kVA	: 37.5	Peak kVA	: None
Running PF	: 0.85	Starting PF	: 0.61	Cyclic	: No
Running Amps	: 6.29	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Alternator kW	: 4.44			Voltage	: 480
Shaft Hp	: 5.0	Method	: Across the line		
Shaft kW	: 3.73	Low Inertia	: No		
Efficiency (%)	: 0.84	LRkVA Factor	: 7.5		
Design	: Standard NEMA Design B,C or D	LRkVA Code	: J		
Load Factor	: 100.0				

Step15

Calculated Individual Generator Set Step Load Requirements

Running kW	: 136.0	Starting kW	: 368.0	Cumulative Step kW	: 1412.0
Running kVA	: 151.0	Starting kVA	: 691.0	Cumulative Step kVA	: 1878.0
Running Amps	: 181.0	Starting Non-linear kVA	: 0.0		
Running Non-linear kVA	: 0.0				
Alternator kW	: 135.94				
Voltage Distortion Limit for step	: 10				

Disinfecting Bldg Unit Heaters - 10kW		Three Phase	Quantity	: 5 In this Step
Category	: Light - Fluorescent			
Running kW	: 10.0	Starting kW	: 10.0	Peak kW : None
Running kVA	: 10.53	Starting kVA	: 10.53	Peak kVA : None
Running PF	: 0.95	Starting PF	: 0.95	Cyclic : No
Running Amps	: 12.68	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip : 10.0
Alternator kW	: 10.0			Voltage : 480
CL2 Scum Pumps - 5hp		Three Phase	Quantity	: 2 In this Step
Category	: Motor			
Running kW	: 4.44	Starting kW	: 22.88	Peak kW : None
Running kVA	: 5.22	Starting kVA	: 37.5	Peak kVA : None
Running PF	: 0.85	Starting PF	: 0.61	Cyclic : No
Running Amps	: 6.29	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip : 10.0
Alternator kW	: 4.44			Voltage : 480
Shaft Hp	: 5.0	Method	: Across the line	
Shaft kW	: 3.73	Low Inertia	: No	
Efficiency (%)	: 0.84	LRkVA Factor	: 7.5	
Design	: Standard NEMA Design B,C or D	LRkVA Code	: J	
Load Factor	: 100.0			
CL2 Scrubbers - 25hp		Three Phase	Quantity	: 2 In this Step
Category	: Motor			
Running kW	: 21.19	Starting kW	: 64.9	Peak kW : None
Running kVA	: 23.81	Starting kVA	: 147.5	Peak kVA : None
Running PF	: 0.89	Starting PF	: 0.44	Cyclic : No
Running Amps	: 28.67	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip : 10.0
Alternator kW	: 21.19			Voltage : 480
Shaft Hp	: 25.0	Method	: Across the line	
Shaft kW	: 18.65	Low Inertia	: No	
Efficiency (%)	: 0.88	LRkVA Factor	: 5.9	
Design	: Standard NEMA Design B,C or D	LRkVA Code	: G	
Load Factor	: 100.0			
Exhaust Fans - 10hp		Three Phase	Quantity	: 4 In this Step
Category	: Motor			
Running kW	: 8.67	Starting kW	: 35.51	Peak kW : None
Running kVA	: 9.97	Starting kVA	: 67.0	Peak kVA : None
Running PF	: 0.87	Starting PF	: 0.53	Cyclic : No
Running Amps	: 12.01	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip : 10.0
Alternator kW	: 8.67			Voltage : 480
Shaft Hp	: 10.0	Method	: Across the line	
Shaft kW	: 7.46	Low Inertia	: No	
Efficiency (%)	: 0.86	LRkVA Factor	: 6.7	
Design	: Standard NEMA Design B,C or D	LRkVA Code	: H	

Load Factor : 100.0

Step16

Calculated Individual Generator Set Step Load Requirements

Running kW	: 46.0	Starting kW	: 136.0	Cumulative Step kW	: 1316.0
Running kVA	: 53.0	Starting kVA	: 217.0	Cumulative Step kVA	: 1555.0
Running Amps	: 64.0	Starting Non-linear kVA	: 26.0		
Running Non-linear kVA	: 26.0				
Alternator kW	: 69.39				
Voltage Distortion Limit for step	: 10				

Beltpress 1 - 10hp Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 8.67	Starting kW	: 35.51	Peak kW	: None
Running kVA	: 9.97	Starting kVA	: 67.0	Peak kVA	: None
Running PF	: 0.87	Starting PF	: 0.53	Cyclic	: No
Running Amps	: 12.01	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Alternator kW	: 8.67			Voltage	: 480
Shaft Hp	: 10.0	Method	: Across the line		
Shaft kW	: 7.46	Low Inertia	: No		
Efficiency (%)	: 0.86	LRkVA Factor	: 6.7		
Design	: Standard NEMA Design B,C or D	LRkVA Code	: H		
Load Factor	: 100.0				

Thickener Drive - 1hp Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 1.02	Starting kW	: 8.97	Peak kW	: None
Running kVA	: 1.46	Starting kVA	: 11.8	Peak kVA	: None
Running PF	: 0.7	Starting PF	: 0.76	Cyclic	: No
Running Amps	: 1.76	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Alternator kW	: 1.02			Voltage	: 480
Shaft Hp	: 1.0	Method	: Across the line		
Shaft kW	: 0.75	Low Inertia	: No		
Efficiency (%)	: 0.73	LRkVA Factor	: 11.8		
Design	: Standard NEMA Design B,C or D	LRkVA Code	: N		
Load Factor	: 100.0				

Scum Pump - 5hp Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 4.44	Starting kW	: 22.88	Peak kW	: None
Running kVA	: 5.22	Starting kVA	: 37.5	Peak kVA	: None
Running PF	: 0.85	Starting PF	: 0.61	Cyclic	: No
Running Amps	: 6.29	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Alternator kW	: 4.44			Voltage	: 480
Shaft Hp	: 5.0	Method	: Across the line		
Shaft kW	: 3.73	Low Inertia	: No		

Efficiency (%)	: 0.84	LRkVA Factor	: 7.5
Design	: Standard NEMA Design B,C or D	LRkVA Code	: J
Load Factor	: 100.0		

Thickening Sludge Pump - 7.5hp Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	: 6.21	Starting kW	: 6.21	Peak kW	: None
Running kVA	: 6.9	Starting kVA	: 6.9	Peak kVA	: None
Running PF	: 0.9	Starting PF	: 0.9	Cyclic	: No
Running Amps	: 8.31	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Running NLL kVA	: 6.9				
Starting NLL kVA	: 6.9			Voltage	: 480
Alternator kW	: 12.42				
Shaft Hp	: 7.5	Type	: Variable Frequency Drive		
Shaft kW	: 5.59	Ramp Details	: None		
Rectifier Type	: 6 pulse	THDI %	: 26		
Efficiency (%)	: 0.9	THDV %	: 10		
Load Factor	: 100.0				

Beltpress 2 - 10hp Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 8.29	Starting kW	: 8.29	Peak kW	: None
Running kVA	: 9.21	Starting kVA	: 9.21	Peak kVA	: None
Running PF	: 0.9	Starting PF	: 0.9	Cyclic	: No
Running Amps	: 11.09	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Running NLL kVA	: 9.21				
Starting NLL kVA	: 9.21			Voltage	: 480
Alternator kW	: 16.58				
Shaft Hp	: 10.0	Type	: Variable Frequency Drive		
Shaft kW	: 7.46	Ramp Details	: None		
Rectifier Type	: 6 pulse	THDI %	: 26		
Efficiency (%)	: 0.9	THDV %	: 10		
Load Factor	: 100.0				

Beltpress Conveyors - 5hp Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	: 4.44	Starting kW	: 22.88	Peak kW	: None
Running kVA	: 5.22	Starting kVA	: 37.5	Peak kVA	: None
Running PF	: 0.85	Starting PF	: 0.61	Cyclic	: No
Running Amps	: 6.29	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Alternator kW	: 4.44			Voltage	: 480
Shaft Hp	: 5.0	Method	: Across the line		
Shaft kW	: 3.73	Low Inertia	: No		
Efficiency (%)	: 0.84	LRkVA Factor	: 7.5		
Design	: Standard NEMA Design B,C or D	LRkVA Code	: J		
Load Factor	: 100.0				

hubber and mahr screen		Three Phase	Quantity	: 2 In this Step	
Category	: Motor				
Running kW	: 1.24	Starting kW	: 1.24	Peak kW	: None
Running kVA	: 1.38	Starting kVA	: 1.38	Peak kVA	: None
Running PF	: 0.9	Starting PF	: 0.9	Cyclic	: No
Running Amps	: 1.66	Max. % Voltage Dip	: 20.0	Max. % Frequency Dip	: 10.0
Running NLL kVA	: 1.38				
Starting NLL kVA	: 1.38	Voltage : 480			
Alternator kW	: 2.48				
Shaft Hp	: 1.5	Type	: Variable Frequency Drive		
Shaft kW	: 1.12	Ramp Details	: None		
Rectifier Type	: 6 pulse	THDI %	: 26		
Efficiency (%)	: 0.9	THDV %	: 10		
Load Factor	: 100.0				



Steps and Dips Details Report

Project - Copy of SJRA WWTF 2 Rev2

Project Requirements

Frequency, Hz	: 60.0	Generators Running in Parallel	: 1
Duty	: Standby	Site Altitude, ft(m)	: 361(152)
Voltage	: 277/480, Series Wye	Site Temperature, °C	: 25
Phase	: 3	Max. Altr Temp Rise, °C	: 125
Fuel	: Diesel	Project Voltage Distortion Limit, %	: 10
Emissions	: EPA, stationary emergency application		

Calculated Individual Generator Set Load Running and Peak Requirements

Running kW	: 1226.3	Max. Step kW	: 367.6 In Step 15	Cumulative Step kW	: 1411.8
Running kVA	: 1390.5	Max. Step kVA	: 690.6 In Step 15	Cumulative Step kVA	: 1877.7
Running PF	: 0.88	Peak kW	: None	Cumulative Peak kW	: None
Running NLL kVA	: 352.7	Peak kVA	: None	Cumulative Peak kVA	: None
Alternator kW	: 1543.79				

Generator Set Configuration

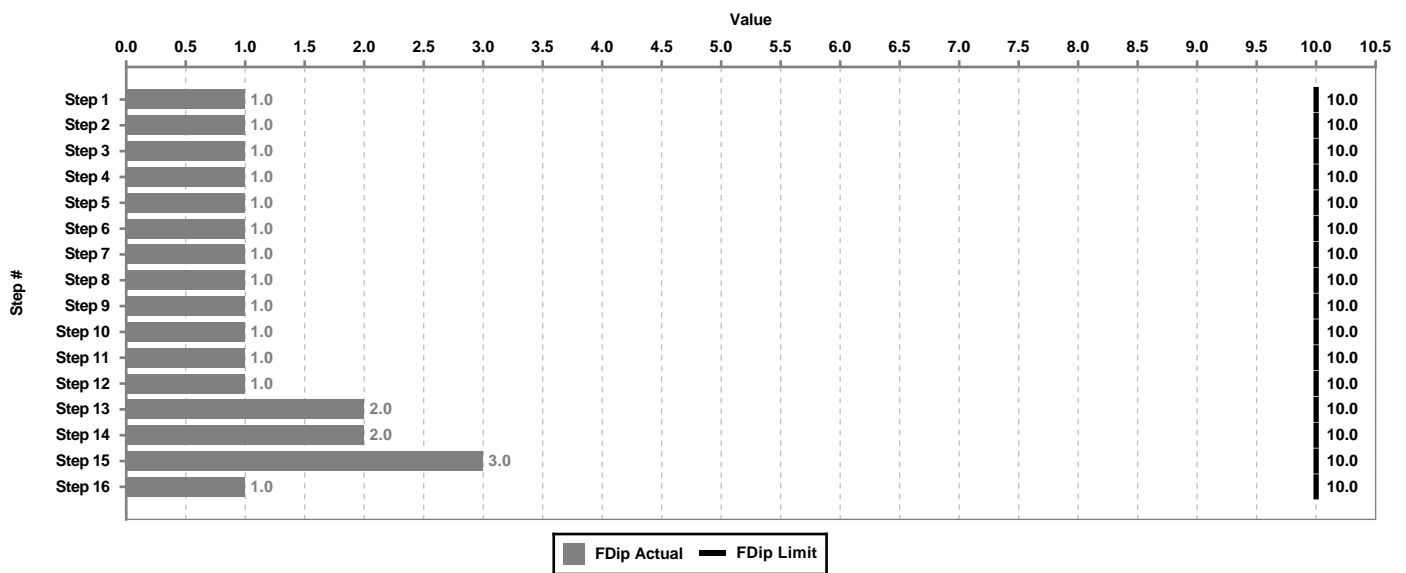
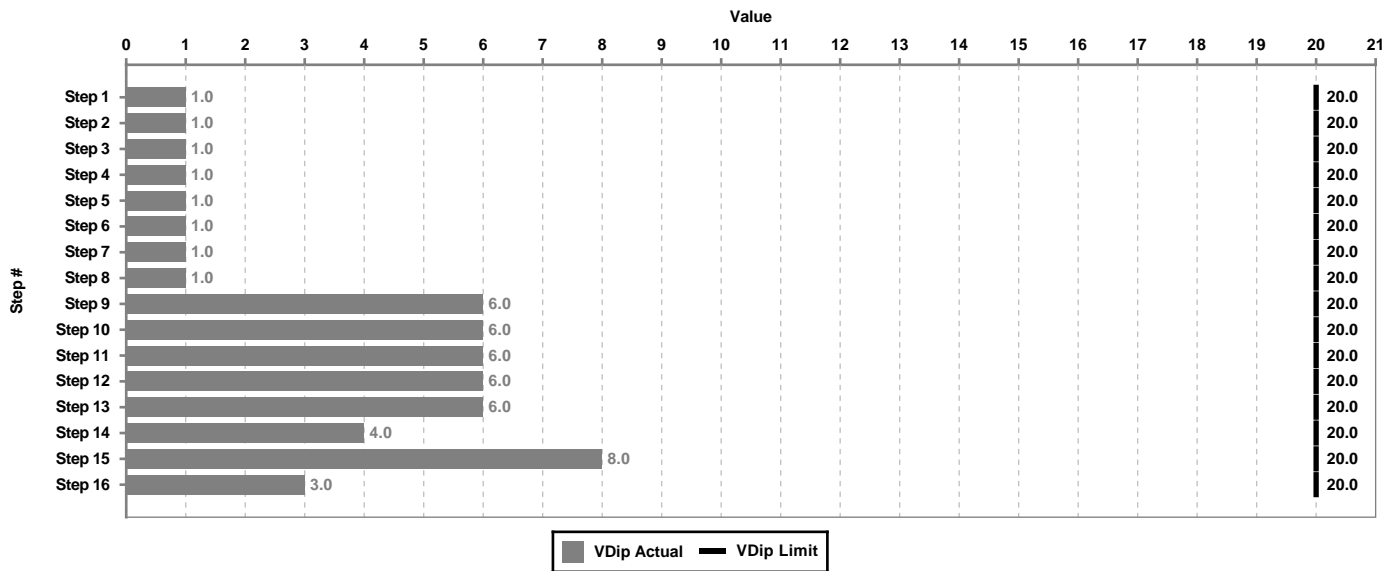
Model	: 1500DQGAB*	Alternator	: P734C
Engine Model	: QSK50-G4 NR2	Excitation	: PMG
Fuel	: Diesel		high ambient

Step Level Dips Summary

Step #	Voltage Dip Limit (%)	Expected Step Voltage Dip (%)	Voltage Recovery Time (s) **	Frequency Dip Limit (%)	Expected Frequency Dip (%)	Frequency recovery Time (s) **
1	20	1	0.1	10	1	0.2
2	20	1	0.1	10	1	0.1
3	20	1	0.1	10	1	0.1
4	20	1	0.1	10	1	0.1
5	20	1	0.1	10	1	0.1
6	20	1	0.1	10	1	0.1
7	20	1	0.1	10	1	0.1
8	20	1	0.1	10	1	0.1
9	20	6	0.2	10	1	0.5
10	20	6	0.2	10	1	0.5
11	20	6	0.2	10	1	0.5
12	20	6	0.2	10	1	0.5
13	20	6	0.5	10	2	1.1
14	20	4	0.3	10	2	0.7
15	20	8	0.6	10	3	1.1
16	20	3	0.2	10	1	0.5

Note: Please refer to the model Spec. sheet for bandwidths used to report recovery times. For products manufactured in the United Kingdom it may be assumed that recovery times are based on ISO8528-5 G2 class bandwidths. Voltage and frequency recovery times are estimates. Typically, allow five to ten seconds between application of load steps when designing your system.

**Please note that in some cases the voltage and frequency recovery time estimates are not shown in list. This is a result of "dummy" data points temporarily being used to fill data gaps in the GenSize database. Please disregard these blank results.



Engine Generator Section



Diesel generator set QSK50 series engine

1100 kW – 1500 kW 60 Hz



Description

Cummins® commercial generator sets are fully integrated power generation systems providing optimum performance, reliability and versatility for stationary standby and prime power applications. Codes or standards compliance may not be available with all model configurations – consult factory for availability.

Features

Cummins Heavy-Duty engine - Rugged 4-cycle, industrial diesel delivers reliable power, low emissions and fast response to load changes.

Alternator - Several alternator sizes offer selectable motor starting capability with low reactance 2/3 pitch windings; low waveform distortion with non-linear loads, fault clearing short-circuits capability.

Permanent Magnet Generator (PMG) - Offers enhanced motor starting and fault clearing short-circuit.

Control system - Standard PowerCommand® electronic control provides total system integration including automatic remote starting/stopping, precise frequency and voltage regulation, alarm and status message display, AmpSentry™ protection, output metering, auto-shutdown at fault detection and NFPA 110 Level 1 compliance.

Cooling system - Standard integral set-mounted radiator system, designed and tested for rated ambient temperatures, simplifies facility design requirements for rejected heat.

NFPA - The genset accepts full rated load in a single step in accordance with NFPA 110 for Level 1 systems.

Warranty and service - Backed by a comprehensive warranty and worldwide distributor network.

Model	Standby rating		Prime rating		Continuous rating		Data sheets	
	60 Hz kW (kVA)	50 Hz kW (kVA)	60 Hz kW (kVA)	50 Hz kW (kVA)	60 Hz kW (kVA)	50 Hz kW (kVA)	60 Hz	50 Hz
DQGAA	1250 (1563)		1100 (1375)				D-3333	
DQGAB	1500 (1875)		1350 (1688)				D-3334	

Generator set specifications

Governor regulation class	ISO8528 Part 1 Class G3
Voltage regulation, no load to full load	± 0.5%
Random voltage variation	± 0.5%
Frequency regulation	Isochronous
Random frequency variation	± 0.25%
Radio frequency emissions compliance	IEC 801.2 through IEC 801.5; MIL STD 461C, Part 9

Engine specifications

Bore	158.8 mm (6.25 in.)
Stroke	158.8 mm (6.25 in.)
Displacement	50.3 Liters (3067 in ³)
Configuration	Cast iron, V 16 cylinder
Battery capacity	1800 amps minimum at ambient temperature of 0 °C (32 °F)
Battery charging alternator	35 amps
Starting voltage	24 volt, negative ground
Fuel system	Cummins' Modular Common Rail System
Fuel filter	Dual Element 10 micron filtration spin-on fuel filter with 15 micron water separator
Air cleaner type	Dry replaceable element
Lube oil filter type(s)	Four spin-on, combination full flow filter and bypass filters
Standard cooling system	High ambient radiator

Alternator specifications

Design	Brushless, 4 pole, drip-proof revolving field
Stator	2/3 pitch
Rotor	Single bearing, flexible disc
Insulation system	Class H
Standard temperature rise	150 °C standby at 40 °C ambient
Exciter type	PMG (Permanent Magnet Generator)
Phase rotation	A (U), B (V), C (W)
Alternator cooling	Direct drive centrifugal blower fan
AC waveform Total Harmonic Distortion (THDV)	< 5% no load to full linear load, < 3% for any single harmonic
Telephone Influence Factor (TIF)	< 50 per NEMA MG1-22.43
Telephone Harmonic Factor (THF)	< 3

Available voltages

60 Hz Line–Neutral/Line-Line			50 Hz Line-Neutral/Line-Line
220/380	277/480	2400/4160	
255/440	347/600		

*Note: Consult factory for other voltages.

Generator set options

Engine

208/240/480 V thermostatically controlled coolant heater for ambient above 4.5 °C (40 °F)
 208/240/480 V thermostatically controlled coolant heater for ambient below 4.5 °C (40 °F)
 Dual 120 V 300 W lube oil heaters
 Dual 208/240 V 300 W lube oil heaters
 Dual 480 V 300 W lube oil heaters

Control panel

120/240 V 100 W control anti-condensation heater
 Paralleling configuration
 Remote fault signal package
 Run relay package
 Exhaust pyrometer
 Fuel pressure indication
 Ground fault indication

Alternator

80 °C rise
 105 °C rise
 125 °C rise
 120/240 V 300 W anti-condensation heater

Exhaust system

Industrial grade exhaust silencer
 Residential grade exhaust silencer
 Critical grade exhaust silencer
 Exhaust packages

Cooling system

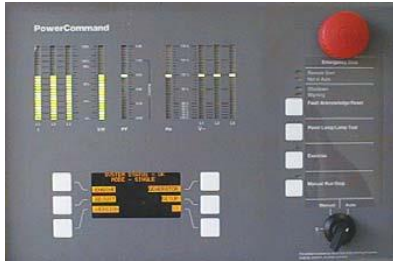
Remote indicator

Generator set

AC entrance box
 Battery
 Battery charger
 Circuit breaker – set mounted
 Disconnect switch - set mounted
 PowerCommand Network
 Remote annunciator panel
 Spring isolations
 2 year warranty
 5 year warranty
 10 year major components warranty

*Note: Some options may not be available on all models - consult factory for availability.

Control system PCC 3201



The PowerCommand 3.3 control is an integrated generator set control system providing governing, voltage regulation, engine protection and operator interface functions. Major features include:

- Integral AmpSentry Protective Relay providing a full range of alternator protection functions that are matched to the alternator provided.
- Battery monitoring and testing features and smart starting control system.
- Three phase sensing, full wave rectified voltage regulation system, with a PWM output for stable operation with all load types.
- Control suitable for operation in ambient temperatures from -40 °C to +70 °C (-40 °F to +158 °F) and altitudes to 5000 meters (13,000 feet).
- Prototype tested; UL, CSA, and CE compliant.
- InPower™ PC-based service tool available for detailed diagnostics.
- Optional Echelon® LONWORKS® network interface.

Operator/display panel

- Off/manual/auto mode switch
- Manual run/stop switch
- Panel lamp test switch
- Emergency stop switch
- Exercise switch
- Alpha-numeric display with pushbutton access for viewing engine and alternator data and providing setup, controls and adjustments
- LED lamps indicating not in auto, common warning, common shutdown, remote start
- Configurable for local language

Engine protection

- Overspeed shut down
- Low oil pressure warning and shut down
- High coolant temperature warning and shut down
- High oil temperature warning
- Low coolant level warning or shut down
- Low coolant temperature warning
- High and low battery voltage warning
- Weak battery warning
- Dead battery shut down
- Fail to start (overcrank) shut down
- Fail to crank shut down
- Redundant start disconnect
- Cranking lockout
- Sensor failure indication

Engine data

- DC voltage
- Lube oil pressure
- Coolant temperature
- Lube oil temperature
- Engine speed
- Engine ECM data

AmpSentry AC protection

- Over current and short-circuit shut down
- Over current warning
- Single and three phase fault regulation
- Over and under voltage shut down
- Over and under frequency shut down
- Overload warning with alarm contact
- Reverse power and reverse Var shut down

Alternator data

- Line-to-Line and Line-to-Neutral AC volts
- Three phase AC current
- Frequency
- Total and individual phase power factor, kW and kVA
- Bus voltage and frequency (with paralleling options)

Other data

- Genset model data
- Start attempts, starts, running hours
- kW hours (total and since reset)
- Fault history
- Load profile (accessible with InPower)

Governing

- Digital electronic isochronous governor
- Temperature dynamic governing
- Smart idle speed mode

Voltage regulation

- Digital PWM electronic voltage regulation
- Three phase Line-to-Neutral sensing
- Single and three phase fault regulation
- Configurable torque matching

Control functions

- Data logging on faults
- Fault simulation (requires InPower)
- Time delay start and cooldown
- Cycle cranking
- Configurable customer outputs (4)
- Configurable network inputs (8) and outputs (16) (with optional network)
- Remote emergency stop

Paralleling (Option)

- Active digital phase lock loop synchronizer
- Isochronous kW and kVar load sharing controls
- kW import/export and kVar/PF control for utility (mains) paralleling

Options

- Thermostatically controlled space heater
- Key-type mode switch
- Ground fault module
- Auxiliary relays (3)
- Echelon LONWORKS interface
- Modion Gateway to convert to Modbus (loose)
- PowerCommand iWatch web server for remote monitoring and alarm notification (loose)
- Digital input and output module(s) (loose)
- Remote annunciator (loose)
- Paralleling
- Power transfer control

For further detail see document S-1444.

Ratings definitions

Emergency Standby Power (ESP):

Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Limited-Time running Power (LTP):

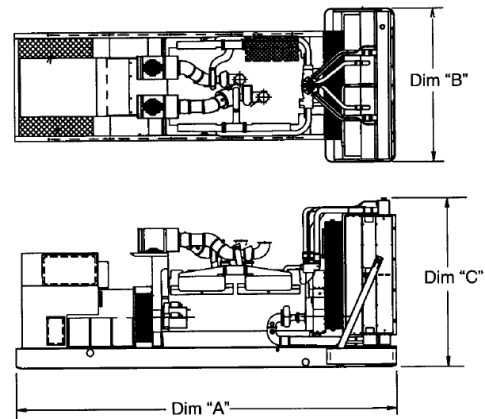
Applicable For Supplying power to a constant electrical load for limited hours. Limited-Time Running Power (LTP) is in accordance with ISO 8528.

Prime Power (PRP):

Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Base Load (Continuous) Power (COP):

Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.







This outline drawing is for reference only. See respective model data sheet for specific model outline drawing number.

Do not use for installation design

Model	Dim 'A' (mm) (in.)	Dim 'B' (mm) (in.)	Dim 'C' (mm) (in.)	Set Weight dry* kg (lbs)	Set Weight* wet kg (lbs)
DQGAA	5969 (235)	2007 (79)	2840 (112)	10989 (24220)	11493 (25330)
DQGAB	5969 (235)	2007 79)	2840 (112)	10989 (24220)	11493 (25330)

* Note: Weights represent a set with standard features. See outline drawings for weights of other configurations.

Codes and standards

	<p>This generator set is designed in facilities certified to ISO 9001 and manufactured in facilities certified to ISO 9001 or ISO 9002.</p>		<p>The generator set is available listed to UL 2200, Stationary Engine Generator Assemblies for all 60 Hz low voltage models. The PowerCommand control is Listed to UL 508 – Category NITW7 for U.S. and Canadian usage. Circuit breaker assemblies are UL 489 Listed for 100% continuous operation and also UL 869A Listed Service Equipment.</p>
	<p>The Prototype Test Support (PTS) program verifies the performance integrity of the generator set design. Cummins products bearing the PTS symbol meet the prototype test requirements of NFPA 110 for Level 1 systems.</p>	<p>U.S EPA</p>	<p>Engine certified to Stationary Emergency U.S. EPA New Source Performance Standards, 40 CFR 60 subpart IIII Tier 2 exhaust emission levels. U.S. applications must be applied per this EPA regulation.</p>
	<p>All low voltage models are CSA certified to product class 4215-01.</p>	<p>International Building Code</p>	<p>The generator set package set is available certified for seismic application in accordance with the following International Building Code: IBC2000, IBC2003, IBC2006 and IBC2009.</p>

For more information contact your local Cummins distributor or visit power.cummins.com

Our energy working for you.™



Generator set data sheet



Model: DQGAB
 Frequency: 60 Hz
 Fuel type: Diesel
 KW rating: 1500 standby
 1350 prime
 Emissions level: EPA NSPS Stationary Emergency Tier 2

Exhaust emission data sheet:	EDS-1059
Exhaust emission compliance sheet:	EPA-1093
Sound performance data sheet:	MSP-1034
Cooling performance data sheet:	MCP-152
Prototype test summary data sheet:	PTS-265
Standard set-mounted radiator cooling outline:	0500-4357
Optional remote radiator cooling outline:	0500-4309

Fuel consumption	Standby				Prime			
	kW (kVA)				kW (kVA)			
Ratings	1500 (1875)				1350 (1688)			
Load	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full
US gph	35.4	58.2	81	103.8	33.1	53.6	74.2	94.7
L/hr	133.9	220.3	306.6	393	125.3	203	208.7	358.4

Engine	Standby rating	Prime rating
Engine manufacturer	Cummins Inc.	
Engine model	QSK50-G4 NR2	
Configuration	Cast iron, V 16 cylinder	
Aspiration	Turbocharged and low temperature aftercooled	
Gross engine power output, kWm (bhp)	1656 (2220)	1470 (1971)
BMEP at set rated load, kPa (psi)	2192 (318)	1957 (284)
Bore, mm (in)	159 (6.25)	
Stroke, mm (in)	159 (6.25)	
Rated speed, rpm	1800	
Piston speed, m/s (ft/min)	9.5 (1875)	
Compression ratio	15:1	
Lube oil capacity, L (qt)	235 (248)	
Overspeed limit, rpm	2100 ±50	
Regenerative power, kW	168	

Maximum fuel flow, L/hr (US gph)	912 (241)
Maximum fuel inlet restriction, kPa (in Hg)	16.9 (5)
Maximum fuel inlet temperature, °C (°F)	71 (160)

Air	Standby rating	Prime rating
Combustion air, m ³ /min (scfm)	139 (4895)	133 (4700)
Maximum air cleaner restriction, kPa (in H ₂ O)	3.7 (15)	
Alternator cooling air, m ³ /min (cfm)	207 (7300)	

Exhaust

Exhaust flow at set rated load, m ³ /min (cfm)	342 (12065)	312 (11000)
Exhaust temperature, °C (°F)	491 (915)	446 (835)
Maximum back pressure, kPa (in H ₂ O)	6.78 (27)	

Standard set-mounted radiator cooling

Ambient design, °C (°F)	40 (104)	
Fan load, kW _m (HP)	45 (60)	
Coolant capacity (with radiator), L (US gal)	541 (143)	
Cooling system air flow, m ³ /min (scfm)	1705 (60150)	
Total heat rejection, MJ/min (Btu/min)	72.3 (68580)	64.8 (61510)
Maximum cooling air flow static restriction, kPa (in H ₂ O)	0.12 (0.5)	
Maximum fuel return line restriction kPa (in Hg)	34 (10)	

Optional remote radiator cooling¹

Set coolant capacity, L (US gal)		
Max flow rate at max friction head, jacket water circuit, L/min (US gal/min)	1893 (500)	
Max flow rate at max friction head, aftercooler circuit, L/min (US gal/min)	537 (142)	
Heat rejected, jacket water circuit, MJ/min (Btu/min)	35.44 (33610)	32.11 (30455)
Heat rejected, aftercooler circuit, MJ/min (Btu/min)	26.93 (25545)	23.96 (22725)
Heat rejected, fuel circuit, MJ/min (Btu/min)		
Total heat radiated to room, MJ/min (Btu/min)	13.1 (12420)	11.9 (11275)
Maximum friction head, jacket water circuit, kPa (psi)	67 (10)	
Maximum friction head, aftercooler circuit, kPa (psi)	48 (7)	
Maximum static head, jacket water circuit, m (ft)	18.3 (60)	
Maximum static head, aftercooler circuit, m (ft)	18.3 (60)	
Maximum jacket water outlet temp, °C (°F)	104 (220)	100 (212)
Maximum aftercooler inlet temp at 25 °C (77 °F) ambient, °C (°F)	49 (120)	
Maximum aftercooler inlet temp, °C (°F)	71 (160)	66 (150)
Maximum fuel flow, L/hr (US gph)	469 (124)	
Maximum fuel return line restriction, kPa (in Hg)	34 (10)	

Weights²

Unit dry weight kgs (lbs)	12700 (28000)
Unit wet weight kgs (lbs)	13270 (29260)

Notes:

¹ For non-standard remote installations contact your local Cummins Power Generation representative.

² Weights represent a set with standard features. See outline drawing for weights of other configurations.

Derating factors

Standby	Full rated power available up to 1134.0m (3719.6 ft) elevation at ambient temperatures up to 40 °C (104 °F). Full rated power available up to 702.5m (2304.2 ft) elevation at ambient temperatures up to 50 °C (120 °F). Above these conditions derate by 6.6% per 305m (1000 ft) and derate by an additional 10.3% per 10 °C (18 °F).
Prime	Full rated power available up to 1334.9m (4378.6 ft) elevation at ambient temperatures up to 40 °C (104 °F). Above these conditions derate by 5.8% per 305m (1000 ft) and derate by an additional 14.0% per 10 °C (18 °F).

Ratings definitions

Emergency standby power (ESP):	Limited-time running power (LTP):	Prime power (PRP):	Base load (continuous) power (COP):
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.	Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) is in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.

Alternator data

Voltage	Connection ¹	Temp rise degrees C	Duty ²	Single phase factor ³	Max surge kVA ⁴	Winding No.	Alternator data sheet	Feature Code
380	Wye, 3-phase	125	P		5743		ADS-332	B596-2
380	Wye, 3-phase	150/105	S/P		6716		ADS-333	B595-2
380	Wye, 3-phase	80	P		6716		ADS-333	B687-2
380	Wye, 3-phase	105/80	S/P		7361		ADS-334	B599-2
380	Wye, 3-phase	80	S		7695		ADS-335	B660-2
440	Wye, 3-phase	125	P		4602		ADS-330	B692-2
440	Wye, 3-phase	150/125	S/P		5521		ADS-331	B691-2
440	Wye, 3-phase	125/105	S/P		5743		ADS-332	B663-2
440	Wye, 3-phase	80	S		6716		ADS-333	B688-2
440	Wye, 3-phase	80	P		7695		ADS-331	B689-2
480	Wye, 3-phase	105	P		4602		ADS-330	B693-2
480	Wye, 3-phase	125/105	S/P		5521		ADS-331	B276-2
480	Wye, 3-phase	80	P		5521		ADS-331	B694-2
480	Wye, 3-phase	105/80	S/P		5743		ADS-332	B600-2
480	Wye, 3-phase	80	S		6716		ADS-333	B601-2
600	Wye, 3-phase	105	P		4602		ADS-330	B581-2
600	Wye, 3-phase	125/105	S/P		5521		ADS-331	B602-2
600	Wye, 3-phase	80	P		5521		ADS-331	B695-2
600	Wye, 3-phase	105/80	S/P		5743		ADS-332	B603-2
600	Wye, 3-phase	80	S		6716		ADS-333	B604-2
4160	Wye, 3-phase	105	P		6204		ADS-322	B312-2
4160	Wye, 3-phase	105/80	S/P		7005		ADS-323	B313-2

Notes:

¹ Limited single phase capability is available from some three phase rated configurations. To obtain single phase rating, multiply the three phase kW rating by the Single Phase Factor³. All single phase ratings are at unity power factor.

² Standby (S), Prime (P) and Continuous ratings (C).

³ Factor for the *Single Phase Output from Three Phase Alternator* formula listed below.

⁴ Maximum rated starting kVA that results in a minimum of 90% of rated sustained voltage during starting.

Formulas for calculating full load currents:

Three phase output

$$\frac{\text{kW} \times 1000}{\text{Voltage} \times 1.73 \times 0.8}$$

Single phase output

$$\frac{\text{kW} \times \text{SinglePhaseFactor} \times 1000}{\text{Voltage}}$$

Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is open.

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Our energy working for you.™

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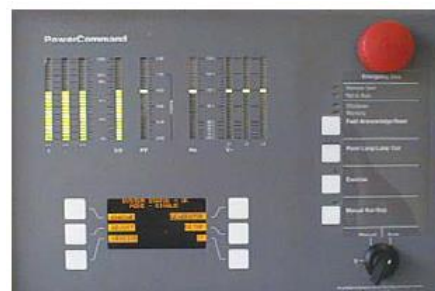
D-3334k (6/15)



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PowerCommand®

3201 digital generator set control



Description

The PowerCommand 3201 control is a microprocessor-based generator set monitoring, metering and control system. The control provides an operator interface to the genset, digital voltage regulation, digital governing and generator set protective functions. It may incorporate optional automatic digital paralleling controls and/or power transfer controls. The integration of all the functions into a single control system provides enhanced reliability and performance compared to conventional control systems.

The PowerCommand control is designed for mounting on the generator set and is suitable for use on generator sets ranging in size from 20 kW to 4000 kW. It will directly read AC voltages up to 600 VAC and can be configured for any frequency, voltage and power connection configuration from 120 to 13,800 VAC. The operator panel may be remote-mounted from the generator set and connected via an RS485 network connection.

The control offers a wide range of standard control and digital display features so custom control configurations are not needed to meet application requirements and system reliability is not compromised by use of untested special components. Power for PowerCommand Control is usually derived from the generator set starting batteries. It functions over a voltage range from 8 VDC to 35 VDC.

Features

Digital full authority electronic engine controls -

Provide engine monitoring, protection and governing. These functions are integrated with voltage regulation and paralleling functions for optimum system performance.

Digital voltage regulation - Provides fast, controlled response to load changes and high levels of immunity to the effects of non-linear loads.

AmpSentry™ protective relay - UL listed, true alternator overcurrent protection.

AC output metering - Includes analog and digital display.

Battery monitoring system - Senses and warns against weak battery condition that is not detected by conventional DC over and undervoltage monitoring.

Message display - Digital alarm and status.

Generator set monitoring - Displays status of all critical engine and alternator generator set functions.

Smart starting control system - Integrated fuel ramping to limit black smoke and frequency overshoot, in addition to optimized cold weather starting.

Advanced serviceability - Utilizes InPower™, a PCbased software service tool.

Digital power transfer control - Optional control functions that allow operation in open transition, closed transition or soft (ramping) transfer modes.

PowerCommand LonWorks® network - Optional network interface providing expanded input/output capability, remote monitoring and control by annunciators and other equipment, and easier installation.

Warranty - Backed by a comprehensive warranty and worldwide distributor service network.

Operator panel

The operator panel provides the user with a complete package of easy to view and use information. It includes an enhanced graphical operator panel that allows the user to view up to 9 lines of information, as well as graphical displays of system data. Connections to the operator panel are sealed, locking plug interfaces for reliable, vibration-resistant interconnection to the generator set wiring harness.

Control switches and functions



Off/manual/auto mode control switch - The *not in auto* lamp will flash when the control is in the *manual* or *off* mode. In the *auto* mode, the generator set can be started using the exercise push-button or with a start signal from a remote device, such as automatic transfer switches.

Manual run/stop control switch and indicating LED - When the mode control switch is in the *manual* position and the *manual run/stop* switch is pressed, the generator set will start, bypassing all time delay starts. (Time delay idle can also be bypassed with another control action.) If the generator set is running in the *manual* mode, pressing the *run/stop* switch will cause the generator set to shut down. An LED (light emitting diode) lamp adjacent to the switch will light to indicate the generator set is in manual mode.

Exercise control switch and indicating LED - When the mode control switch is in the *auto* position the *exercise* control switch is used to complete a pre-programmed exercise sequence. All exercise functions are disabled when an emergency start command is received by the control. An LED lamp adjacent to the switch will light to indicate the generator set is in exercise mode.

Panel lamp/lamp test control switch.

Fault acknowledge/reset switch - The control includes a fault acknowledge function to allow the operator to reset the fault condition. If the fault condition is not corrected, the fault will reappear, but will not be logged as a separate event. Multiple faults can be logged and displayed at one time.

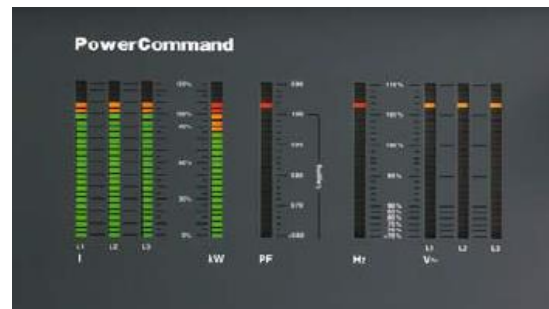
Emergency stop control switch.

Operator adjustments - The control includes provisions for many set up and adjustment functions via raise/lower switches on the operator panel. Functions that can be adjusted by the operator include:

- Time delay start (0-300 seconds)
- Time delay stop (0-600 seconds)
- Alternator voltage (+5%)
- Alternator frequency (+3 Hz)

The operator panel can be configured to require an access code prior to adjusting these values. A second access code is used to protect the control from unauthorized service level adjustments. Voltage and frequency adjustments are disabled during operation in parallel with a system bus to prevent inadvertent misadjustment of the paralleling load sharing functions.

Analog AC metering panel



The PowerCommand control is equipped with an analog AC metering panel that simultaneously displays 3-phase Line-to-Line AC volts and current, kW, power factor and frequency.

The meter panel is composed of a series of LEDs configured in bar graphs for each function. The LEDs are color coded with green indicating normal range values, amber for warning levels and red for shutdown conditions. Scales for each function are in % of nominal rated values.

Graphical display panel



The PowerCommand control is provided with a graphical display capable of displaying up to 9 lines of data with approximately 27 characters per line. The graphical display is accompanied by a set of six tactile-feel membrane switches that are used by the operator to navigate through control menus and to make control adjustments. Display is configurable for multiple languages. It is configurable for units of measurement. The display incorporates three levels of operation and adjustability. All data on the control can be viewed by scrolling through screens with the navigation keys. The top three lines of the display are allocated to mode and status messages that continuously display the operating mode of the control system, as well as any faults or warning conditions that may be present on the controller. If more than one fault or warning message is present, the messages will scroll to allow the operator to view all active messages in the system.

Screen-saver mode - The operator panel can be programmed to automatically switch off to reduce battery voltage drain when the control is not being used and the generator set is not running. Depressing any button on the operator panel, new fault conditions or receipt of a remote signal at the control will "wake up" the control.

Generator set data

Generator set hardware data - Generator set rating in kVA, complete generator set model number and serial number, engine model and serial number and alternator model and serial number. The control also displays the part number of the control and the software version present in the control.

Data logs - Number of start attempts and number of start attempts since reset. Number of times generator set has run and number of times since reset. Duration of generator set running time and duration of running time since last reset. Generator set kWh produced and kWh produced since last reset.

Adjustment history - Record of adjustment and setting changes made on the control, identifies whether adjustment was made via the operator panel or with a service tool. If a service tool is used, the control provides a record of the serial number of the tool used. This information is read with InPower.

Fault history - Record of the most recent fault conditions with time stamp, along with the number of times each fault has occurred. At least 20 events are stored in the control memory.

Load profile data - Data indicating the total operating hours at percent of load in 10% increments and since reset.

Generator set AC data

Generator set output frequency, voltage and current - All phases (Line-to-Line and Line-to-Neutral for voltage. Accuracy 1%.

Generator set power output - PowerCommand displays generator set kW and kVA output (average phase, individual phase and direction of flow) and power factor with leading/lagging indication. Accuracy 5%.

Generator set kWh energy output - Total kWh produced and total produced since last reset with time stamp of time of last reset.

Digital synchroscope - Bus voltage and frequency, generator set bus voltage and frequency, the phase angle displacement and a signal indicating "ready to close". A breaker control switch is included on this panel for convenient operation of the equipment without switching between viewing screens.

Engine data

Basic engine data - Engine starting battery voltage, engine lube oil pressure and engine coolant temperature.

Engine service data - Varies with engine used, but typically includes: Engine coolant pressure, engine fuel rail temperature and pressure, engine fuel input and output temperature, intake manifold temperature and pressure, ambient air pressure, crankcase blowby flow and aftercooler inlet coolant temperature.

Engine fuel consumption - The fuel consumed by the engine is calculated by the control based on fuel flow into the engine and returned by the engine, and the temperature of the two flow streams. Accuracy is + 5% over 500 hours of operation. Data provided includes overall average fuel consumed and consumption since reset. This information is read with InPower.

Engine exhaust temperature (optional).

Power transfer control data (optional)

Utility (mains) source data - Displays Line-to-Line and Line-to-Neutral voltage of utility (mains) source, frequency and estimated amps, and kW and kVA supplied by utility (mains) source (optional when power transfer control is used).

System status information - Provides graphical system status display showing availability of sources and positions of each contactor.

System control - Allows operator to view status of system and manually control operation of the system. Provides manual adjustment capability for time delay start, stop, transfer and retransfer, as well as time delays for program transition (when used) and power transfer overlap time.

Internal control functions

General functions

System control voltage - The control operates on 24 VDC from the generator set starting batteries. Control functions are fully operational over a voltage range of 8 VDC to 36 VDC.

Emergency start mode - PowerCommand accepts a ground signal from remote devices or a network signal to automatically start the generator set and immediately accelerate to rated speed and voltage.

PowerCommand includes a smart starting system that is designed to quickly start the engine, minimize black smoke, minimize voltage and frequency overshoot, and oscillations on starting. The control system does this by careful simultaneous control of the engine fuel system and alternator excitation system.

Non-emergency start mode - The control is provided with a separate remote start input or a network signal to start the generator set via the programmable idle control. Using the non-emergency mode, the generator set takes longer to start, but there is less wear on the engine. In this start mode, the generator set will start, operate at idle speed for a predefined time period or until the engine reaches operating temperature (whichever time is shorter), and then ramp to rated speed and voltage. Time delay is adjustable from 0-300 seconds and default is 10 seconds. The control also monitors and records the source of start signals, when that information is available. The control automatically exits idle mode if an emergency remote start signal is received at the control.

Data logging - The control maintains a record of manual control operations, warning and shutdown conditions and other events. It uses the control "on" time as the timestamp means when a real time clock is not included with the control. The control also stores critical engine and alternator data before and after a fault occurs, for use by InPower and the technician in evaluating the root causes for the fault condition.

Fault simulation mode - PowerCommand, in conjunction with InPower software, will accept commands to allow a technician to verify the proper operation of critical protective functions of the control by simulating failure modes or by forcing the control to operate outside of its normal operating ranges. InPower also provides a complete list of faults and settings for the protective functions of the specific generator set it is communicating with.

Built in test - The control system automatically tests itself, and all the sensors, actuators and harnesses in the control system, on a startup signal. The test can also be initiated from InPower and can be accomplished either locally to the generator set or remotely.

Engine control

Engine starting - The control operates a factory-supplied fuel valve that enables engine starting.

Cycle cranking - Configurable for number of starting cycles (1 to 7) and duration of crank and rest periods. Control includes starter protection algorithms to prevent the operator from specifying a starting sequence that might be damaging. Default setting is for (3) start cycles composed of 15 seconds of cranking and 15 seconds of rest.

Programmable idle speed control - In this mode the generator set would start and run to idle speed. It would operate at that speed for a programmed time period, then ramp to rated speed. When the control gets a signal to stop, it will ramp to idle, operate for the programmed period at idle and then shut down. During idle mode, engine protective functions are adjusted for the lower engine speed and alternator function is disabled.

Time delay start and stop (cool down) - Configurable for time delay of 0-300 seconds prior to starting after receiving a remote start signal in normal operation modes and for time delay of 0-600 seconds prior to ramp-to-idle or shutdown after signal to stop in normal operation modes. The generator set control will monitor the load during operation of the generator set, and if the total load on the set is less than 10% of rated it will reduce the operation time for the time delay stop in order to prevent extended operation of the engine at very light load levels. Default for both time delay periods is 0 seconds.

Engine governing

Isochronous governing - Controls engine speed within $\pm 0.25\%$ for any steady state load from no load to full load. Frequency drift will not exceed $\pm 0.5\%$ for a 33 °C (60 °F) change in ambient temperature over an 8 hour period.

Droop governing - Control can be adjusted to droop from 0 to 10% from no load to full load, using InPower.

Temperature dynamics - Modifies the engine fuel system control parameters as a function of engine temperature. Allows engine to be more responsive when warm and more stable when operating at lower temperature levels.

Isochronous load sharing control - See *Paralleling Functions/Load sharing controls*.

Droop load sharing control - See *Paralleling Functions/Load sharing controls*.

Idle mode - Engine governing can be regulated at an idle speed for a programmed period on start or stop of the engine. When the engine is operating at idle speed, the alternator excitation is automatically switched off.

Alternator control

Digital output voltage regulation - PowerCommand will regulate output voltage to within 0.5% for any loads between no load and full load. Voltage drift will not exceed $\pm 0.5\%$ for a 33 °C (60 °F) change in temperature in an 8 hour period. On engine starting, or sudden load acceptance, voltage is controlled to a maximum of 5% overshoot over nominal level.

Torque-matched V/Hz overload control - The voltage roll-off set point and rate of decay (i.e., the slope of the V/Hz curve) is adjustable in the control. This function is automatically disabled when the control is in a synchronizing mode.

Fault current regulation - PowerCommand will regulate the output current on any phase to a maximum of 3 times rated current under fault conditions for both single phase and three phase faults. In conjunction with a permanent magnet generator, it will provide 3 times rated current on

all phases for motor starting and short circuit coordination purposes.

Isochronous (kVar) load sharing control - See *Paralleling Functions/Load sharing controls*.

Droop (kVar) load sharing control - See *Paralleling Functions/Load sharing controls*.

Protective functions

On a warning condition, the control will indicate a fault by lighting the warning LED on the control panel and displaying the fault name and code on the operator display panel. The nature of the fault and time of occurrence are logged in the control. The service manual and InPower service tool provide service keys and procedures based on the service codes provided.

On a shutdown condition, the control will light the shutdown LED on the control panel, display the fault name and code, initiate shutdown and lock out the generator set. The shutdown sequence of the generator set includes programmable cooldown at idle for fault conditions that do not endanger the engine. The control maintains a data log of all fault conditions as they occur and time stamps them with the controller run time and engine operating hours data. Adjustments to most set points are made using the InPower service tool.

The control system includes a “*fault bypass*” mode that forces the system to function regardless of the status of protective functions. In this mode, the only protective functions that are operational are over speed, loss of both speed sensors, moving the control switch to the *off* position or pressing the *emergency stop* switch. The control maintains a record of the time that the mode is enabled and of all warning or shutdown conditions that have occurred while in the “*fault bypass*” mode.

Many protective functions within the control system are configurable for warning, shutdown or both (2 levels). Exceptions to this include functions such as over speed conditions, and loss of speed sensing. In addition, some warning functions can incorporate control functions as a consequence of a fault.

System protective functions:

Ground fault warning (option - 600 VAC class generator sets) - Ground (earth) fault sensing is adjustable over a range of 100-1200 amps with time delays of 0-1 second. May be configured for shutdown rather than alarm.

Configurable alarm and status inputs - PowerCommand will accept up to four alarm or status inputs (contact closed to ground) to indicate customer-specified conditions. The control is programmable for warning, shutdown or status indication and for labelling the input (up to 24 characters). Sixteen additional faults can be input to the control via the network.

Breaker fail to close and breaker auxiliary contact warning or shutdown - When the paralleling control signals a circuit breaker to close, it will monitor the breaker auxiliary contacts and verify that the breaker has connected the generator set to the system bus. If the control does not sense a breaker closure within 0.5 second of the close signal, the control will monitor the phase relationship between the generator set and the bus. If this indicates that the generator set is not closed to the bus, the “*breaker fail to close*” alarm will be indicated, the breaker will be opened and the generator set shut down. If the phase relationship monitor indicates that the generator set is in parallel with the bus, “*circuit breaker auxiliary contact failure*” will be indicated and the generator set will continue to run in normal operation mode.

Breaker fail to open warning - The control system monitors the operation of breakers that have been signalled to open. If the breaker does not open within 1 second of initiation of signal, a “breaker fail to open” warning is initiated. The control will logically allow the generator set to continue to run if shutdown of the generator set with the breaker closed will cause potential damage or operating problems.

Bus or generator set PT input calibration error - The control system monitors the sensed voltage from the bus and generator set output voltage-potential transformers. When the paralleling breaker is closed, it will indicate a warning condition when they read different values.

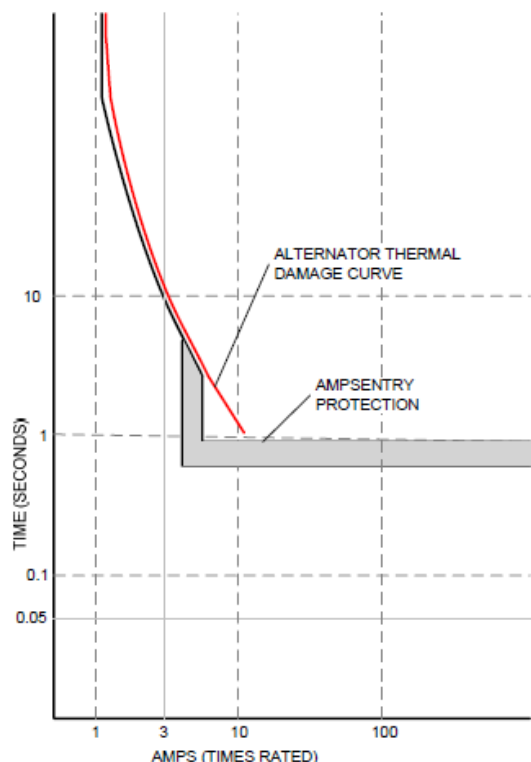
Emergency stop - Annunciated whenever the local or remote emergency stop signal is received. Alarm panel distinguishes between local or remote operation.

AmpSentry protective relay:

AmpSentry protective relay is a UL Listed comprehensive monitoring and control system integral to the PowerCommand Control System that guards the electrical integrity of the alternator and power system by providing protection against a wide array of fault conditions in the generator set or in the load. It also provides single and three phase fault current regulation so that downstream protective devices have the maximum current available to quickly clear fault conditions without subjecting the alternator to potentially catastrophic failure conditions. See document R1053 below for a full size time over current curve. The control does not include protection required for interconnection to a utility (mains) service.

Over current warning - Output current on any phase at more than 110% of rating for more than 60 seconds.

Over current shutdown (51V) - Output current on any phase is more than 110%, less than 175% of rating and approaching thermal damage point of alternator. Control includes algorithms to protect alternator from repeated over current conditions over a short period of time. The control does not include instantaneous trip functions, as they are not necessary for alternator protection and complicate short circuit coordination (discrimination).



Short circuit shutdown (51) - Output current on any phase is more than 175% of rating at time of shutdown. The control replicates the function of a 51V relay by discriminating between short circuit conditions and shutdown conditions, and shutting down the genset as fast as is necessary on a short circuit condition while operating as long as is possible on an overload condition. Control includes algorithms to protect alternator from repeated over current conditions over a short time.

High AC voltage shutdown (59) - Output voltage on any phase exceeds preset values. Time to trip is inversely proportional to amount above threshold. Values adjustable from 105-125% of nominal voltage, with time delay adjustable from 0.25-10 seconds. Default value is 110% for 10 seconds.

Low AC voltage shutdown (27) - Voltage on any phase has dropped below a preset value. Adjustable over a range of 50-95% of reference voltage, time delay 2-10 seconds. Default value is 85% for 10 seconds. Function tracks reference voltage. Control does not nuisance trip when voltage varies due to the control directing voltage to drop, such as during a voltage roll-off during synchronizing.

Under frequency shutdown (81u) - Generator set output frequency cannot be maintained. Settings are adjustable from 0-10 Hz below nominal governor set point, for a 0-20 second time delay. Default: 6 Hz, 10 seconds. Under frequency protection is disabled when excitation is switched off (such as when engine is operating in idle speed mode or the synchronizer is enabled).

Over frequency shutdown/warning (81o) - Generator set is operating at a potentially damaging frequency level. Defaults: Disabled.

Over load (kW) warning - Provides a warning indication when engine is operating at a load level over a set point. Adjustment range: 80-140% of rated kW, 0-120 second delay. Defaults: 105%, 60 seconds.

Reverse power shutdown (32) - Adjustment range: 5-20% of standby kW rating, delay 1-15 seconds. Defaults: 10%, 3 seconds.

Sync check (25) - Verifies that the generator set is operating in synchronism with the system bus prior to allowing the paralleling breaker to close. Includes dead bus sensing capability.

Fail to synchronize warning or shutdown - Indicates that the generator set could not be brought to synchronization with the system bus. Configurable for warning or shutdown and adjustable for time delay of 10-120 seconds. Default is 120 seconds.

Phase sequence sensing shutdown - Verifies that the generator set phase sequence matches the bus prior to allowing the paralleling breaker to close. The generator set will shutdown if the generator set and bus phase sequence do not match.

Reverse Var shutdown - Shutdown level is adjustable: 15-50% of rated Var output, delay 10-60 seconds. Defaults: 20%, 10 seconds.

High alternator temperature (option).

Engine protection

Over speed shutdown - Default setting is 115% of nominal.

Low lube oil pressure shutdown - Level is preset to match the capabilities of each engine. Control includes time delays to prevent nuisance shutdown signals.

Low lube oil pressure warning - Level is preset to match the capabilities of each engine. Control includes time delays to prevent nuisance shutdown signals.

High coolant temperature shutdown.

High coolant temperature warning.

Low coolant pressure warning/shutdown.

Low coolant level warning/shutdown.

Low coolant temperature warning - Indicates that engine temperature may not be high enough for a 10 second start or proper load pickup.

Low and high battery voltage warning - Indicates battery charging system failure by continuously monitoring battery voltage and indicating a problem when voltage is outside a preset acceptance band.

Discharged battery protection - When DC voltage is below a preset threshold, the control will shut down to avoid completely discharging the battery.

Weak battery warning - The control system will test the battery bank each time the generator set is signalled to start and indicate a warning if the generator set battery indicates impending failure.

Fail to start (overcrank) shutdown.

Fail to crank shutdown - Control has signalled starter to crank engine but engine does not rotate.

Redundant starter disconnect.

Redundant speed sensors - Loss of one sensor results in a mag pickup sensor warning. Loss of both sensors results in mag pickup failure.

Low fuel day tank and low fuel main tank warning.

Cranking lockout - The control will not allow the starter to attempt to engage or to crank the engine when the engine is rotating.

Sensor failure indication - All analog sensors are provided with sensor failure logic to indicate if the sensor or interconnecting wiring has failed. Separate indication is provided for fail high or low.

High crankcase blowby level warning.

High fuel temperature warning.

High intake manifold temperature/pressure.

Aftercooler cooler inlet over temperature.

Paralleling functions (optional)

First Start Sensor™ System - PowerCommand provides a unique control function that positively prevents multiple generator sets from simultaneously closing to an isolated bus under black start conditions. The First Start Sensor system is a communication system between generator sets that allows the generator sets to work together to determine which generator set in a system should be the first to close to the bus. The system includes an independent backup function, so that if the primary system is disabled the required functions are still performed.

Synchronizer - PowerCommand incorporates a digital synchronizing function to force the generator set to match the phase relationship and voltage of the generator set output with the system bus or utility grid. The synchronizer includes provisions to provide proper operation even with highly distorted bus voltage waveforms. The synchronizer includes adjustments for phase angle window (5°-20°) and time delay (0.5-5 seconds). The synchronizer is 3-phase sensing, and includes controls to directly operate a paralleling breaker. The breaker controls include fail to open and fail to close protection.

Load sharing controls - The generator set control includes an integrated load sharing control system for both real (kW) and reactive (kVar) loads when the generator set(s) are operating on an isolated bus. The control system determines kW load on the engine and kVar load on the alternator as a percent of generator set capacity, and then

regulates fuel and excitation systems to maintain system and genset at the same percent of load without impacting voltage or frequency regulation. The control can also be configured for operation in droop mode for kW or kVar load sharing.

Load govern controls - When PowerCommand receives a signal indicating that the generator set is paralleled with an infinite source such as a utility (mains) service, the generator set will operate in load govern mode. In this mode the generator set will synchronize and close to the bus, ramp to a pre-programmed kW and kVar load level, and then operate at that point. Control is adjustable for kW values from 0-100% of standby rating, and 0.7-1.0 power factor (leading). Default setting is 80% of standby and 1.0 power factor. The control includes inputs to allow independent control of kW and kVar load sharing level by a remote device while in the load govern mode. The rate of load increase and decrease is also adjustable in the control.

Load demand control - The control system includes the ability to respond to an external signal to initiate load demand operation. On command, the generator set will ramp to no load, open its paralleling breaker, cool down, and shut down. On removal of the command, the generator set will immediately start, synchronize, connect, and ramp to its share of the total load on the system.

Power transfer control (optional)

The Power transfer control feature allows PowerCommand to provide integrated automatic power transfer functions including source availability sensing and transfer device (circuit breaker) monitoring and control. The control is configurable for open transition, fast transfer (100 mS), or soft (ramping) sequences of operation. Standard functions include:

- 3-phase (Line-to-Neutral) close differential under voltage sensing for utility (mains) service. Sensing for pickup in an adjustable range from 85-100% of nominal, with default at 95% of dropout setting. Dropout is configurable 75-98% of pickup, with default at 85%.
- 3-phase over voltage sensing for normal utility service adjustable for pickup at 95-105% of dropout and dropout configurable for 105-135% of nominal. Time delay is adjustable in a range of 0.5-120 seconds. Default is disabled and is enabled using InPower.
- Under frequency sensing for normal utility service. Adjustment range is 80-95% of nominal. Default is disabled and is enabled using InPower.
- Configurable sequence of operation with or without adjustable program-transition capability. Adjustment range is 0-60 seconds.
- Remote exercise feature accepts a remote signal to initiate with or without load testing, or testing can be initiated by the operator. Test sequence may include a programmed idle period prior to acceleration to rated voltage and frequency, and after cool down. Test may be configured to be performed with load or without load.
- Time delay start and stop as described in this document; time delay transfer adjustable in a range of 0-120 seconds and retransfer in a range of 0-1800 seconds; all in 1-second increments.
- Fail to disconnect timer is adjustable in a range of 0.1 to 120 seconds.

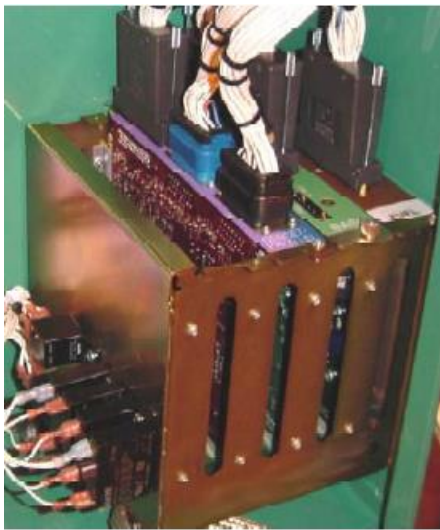
Environment

The control is designed for proper operation without recalibration in ambient temperatures from -40 °C to +70 °C (-40 °F to +158 °F) and for storage from -40 °C to +80 °C (-40 °F to +176 °F). Control will operate with humidity up to 95%, non-condensing and at altitudes up to 5000 m (13,000 ft).

The operator control panel has a single membrane surface which is impervious to the effects of dust, moisture, oil and exhaust fumes. The panel uses sealed membrane or oil-tight switches to provide long reliable service life in harsh environments.

The control system is specifically designed for resistance to RFI/EMI and to resist the effects of vibration to provide a long reliable life when mounted on a generator set. The control includes transient voltage surge suppression to provide compliance to referenced standards.

The control is mounted on a vibration-isolated structure attached to the generator set skid and includes all generator set wiring factory-installed.



Control interface

Input signals to the PowerCommand control include:

Remote start signal - May be connected via either discrete signal or Lon[®] Network or both for premium reliability. Discrete signal is normally open contact to ground or normally closed contact that opens to indicate start signal. Separate signal inputs available for emergency start and non-emergency start.

Remote emergency stop.

Low main or day tank fuel level warning.

Remote alarm reset.

Load demand stop.

Utility parallel (load govern) mode command.

Configurable customer inputs - Control includes provisions for (4) input signals from customer discrete devices. (16) additional input signals can be implemented with the use of external network modules.

Output signals from the control include:

Generator set running signal - Fused normally open contact rated 5 A at 30 VDC/180 VAC, closes to indicate generator set is running.

Generator set common shutdown signal - Self-protected relay driver.

Load shed signal - Self-protected relay driver. Operation is configurable for under frequency or over kW load or both. Adjustment range is 80-140% of standby rating with time delay of 0-120 seconds. Default settings are overload 105%, 60 sec, and under frequency 3 Hz below governor reference for 3 seconds.

Ready to load signal - Self-protected relay driver. Operates when the generator set has reached 90% of rated speed and voltage and latches until generator set is switched to off or idle mode.

Modem control signal - Self-protected relay driver.

Paralleling breaker interface - Fused normally open relay contact (5 A, 30 VDC/180 VAC) for parallel breaker close signal and normally open contact for parallel breaker open signal.

Control power for auxiliary devices is available from the controller.

Network connections include:

Serial interface - This communication port is to allow the control to communicate with a personal computer running InPower service and maintenance software.

Echelon[®] LonWorks interface (option) - System allows for fast, effective incorporation of auxiliary I/O, remote annunciation, redundant start commands from Cummins transfer switches, and other control functions.

Software

InPower - An optional PC-based software service tool that is designed to directly communicate to PowerCommand generator sets and transfer switches to facilitate service and monitoring of these products.

PowerCommand for Windows[®] - An optional software tool that is used to remotely monitor and control generator sets, transfer switches and other on-site power system devices.

Certifications

PowerCommand meets or exceeds the requirements of the following codes and standards:

NFPA110: For Level 1 systems

UL508: Recognized or Listed and suitable for use on UL 2200 Listed generator sets

CSA C282-M: 1999 compliance

CSA 22.2 No. 14 M91: Industrial Controls

ISO 8528-4: 1993 compliance, Controls and Switchgear

NFPA99: Standard for Health Care Facilities

CE Mark

EN 50081-1: Residential, Commercial, Light Industrial

EN 50081-2: Industrial

EN 50082-1: Residential, Commercial, Light Industrial

EN 50082-2: Industrial

ISO 7637, pulses #2b, 4: DC Supply Surge Voltage Test

Mil Std 202C, Method 101: Salt Fog Test

ANSI C62.41: Surge Withstand

IEC 801.2, 3, 4, 5

ISO9001: PowerCommand control systems and generator sets are designed and manufactured in ISO9001 certified facilities.

Warranty

PowerCommand control systems are a part of complete power systems provided by Cummins and are covered by a one year limited warranty as a standard feature.

Extended warranty options are available for coverage up to 10 years.

Options and accessories

- Isolated bus paralleling. Provides all automatic and manual paralleling functions for systems that operate isolated from the utility service.
- Full function paralleling. Provides all paralleling functions, including automatic and manual operation, protection, and other features described in this document.
- Open transition power transfer control. Control will operate two circuit breakers to provide power transfer between a normal source and a generator in a “break before make” sequence.
- Fast closed transition power transfer control. Control will operate two circuit breakers to provide power transfer between a normal source and generator in a “make before break” sequence between live sources, and “break before make” from a failed source. Overlap between sources is 100 mS or less.
- Closed transition (ramping) power transfer control. Control will operate two circuit breakers to provide power transfer between a normal source and generator in a “make before break” sequence between live sources, and “break before make” from a failed source. Overlap time between sources is configurable, and control ramps load from source to source to minimize disturbances on transfer.
- Key-type mode select switch.
- Ground fault alarm module.
- Exhaust temperature monitoring.
- Alternator temperature monitoring.
- Network Interface Module
- Digital remote annunciator. (See S-1343)
- Digital output relay module (See S-1431)
- Modbus[®] interface. (See S-1471)
- Cummins iWatch[™] remote monitoring system (S-1518)
- Cummins iWatch Wireless[™] remote monitoring system (S-1572)
- ILSI (isochronous load sharing interface). Allows PowerCommand to share real load with other load sharing systems that incorporate analog load sharing lines. See document C604 for more information.
- Utility protective relaying. Gensets can be provided with power switching mechanisms and utility grade protective relaying to meet local grid protection requirements.

**For more information contact your local Cummins distributor
or visit power.cummins.com**

Our energy working for you.[™]





Alternator data sheet

Frame size: P734D

Characteristics

Weights:	Stator assembly:	3569 lb	1619 kg
	Rotor assembly:	3034 lb	1376 kg
	Complete assembly:	7315 lb	3318 kg
Maximum speed:		2250 rpm	
Excitation current:	Full load:	3.6 Amps	
	No load:	0.5 Amps	
Insulation system:	Class H throughout		

3 Ø Ratings (0.8 power factor)		60 Hz Voltage (winding no)						
(Based on specific temperature rise at 40° C ambient temperature)		<u>220/380</u> (13)	<u>240/416</u> (13)	<u>220/380</u> (312)	<u>240/416</u> (312)	<u>254/440</u> (312)	<u>277/480</u> (312)	<u>347/600</u> (07)
163° C rise ratings	kW			1368	1552	1656	1728	1728
	kVA			1710	1940	2070	2160	2160
150° C rise ratings	kW			1328	1512	1612	1680	1680
	kVA			1660	1890	2015	2100	2100
125° C rise ratings	kW			1276	1452	1548	1612	1612
	kVA			1595	1815	1935	2015	2015
105° C rise ratings	kW			1188	1352	1440	1500	1500
	kVA			1485	1690	1800	1875	1875
80° C rise ratings	kW			1100	1252	1332	1388	1388
	kVA			1375	1565	1665	1735	1735
Reactances (per unit ± 10%)		<u>220/380</u> (13)	<u>240/416</u> (13)	<u>220/380</u> (312)	<u>240/416</u> (312)	<u>254/440</u> (312)	<u>277/480</u> (312)	<u>347/600</u> (07)
(Based on full load at 125° C rise rating)								
Synchronous				3.95	3.75	3.57	3.12	3.56
Transient				0.25	0.23	0.22	0.19	0.17
Subtransient				0.18	0.17	0.16	0.14	0.14
Negative sequence				0.25	0.24	0.23	0.20	0.19
Zero sequence				0.03	0.03	0.03	0.02	0.02
Motor starting		<u>220/380</u> (13)	<u>240/416</u> (13)	<u>220/380</u> (312)	<u>240/416</u> (312)	<u>254/440</u> (312)	<u>277/480</u> (312)	<u>347/600</u> (07)
Maximum kVA	(90% sustained voltage)			5743	5743	5743	5743	5743
Time constants (sec)		<u>220/380</u> (13)	<u>240/416</u> (13)	<u>220/380</u> (312)	<u>240/416</u> (312)	<u>254/440</u> (312)	<u>277/480</u> (312)	<u>347/600</u> (07)
Transient				0.137	0.137	0.137	0.137	0.137
Subtransient				0.010	0.010	0.010	0.010	0.010
Open circuit				2.250	2.250	2.250	2.250	2.250
DC				0.020	0.020	0.020	0.020	0.020
Windings (@ 20° C)		<u>220/380</u> (13)	<u>240/416</u> (13)	<u>220/380</u> (312)	<u>240/416</u> (312)	<u>254/440</u> (312)	<u>277/480</u> (312)	<u>347/600</u> (07)
Stator resistance	(Line to Line, Ohms)			0.00114	0.00114	0.00114	0.00114	0.00390
Rotor resistance	(Ohms)			1.98	1.98	1.98	1.98	1.98
Number of leads				6	6	6	6	6



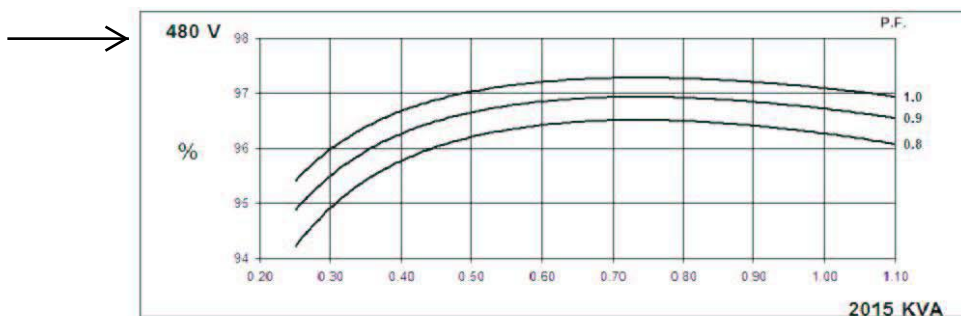
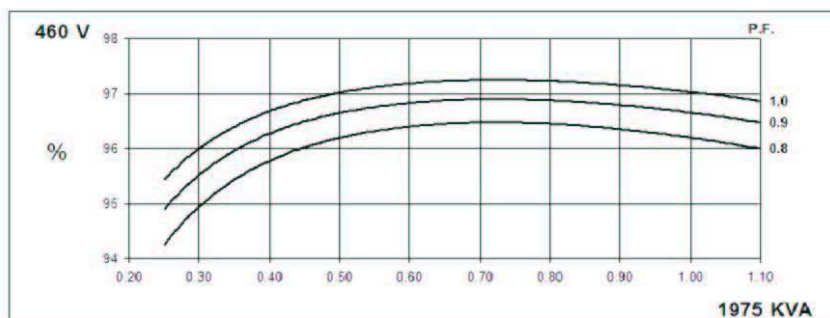
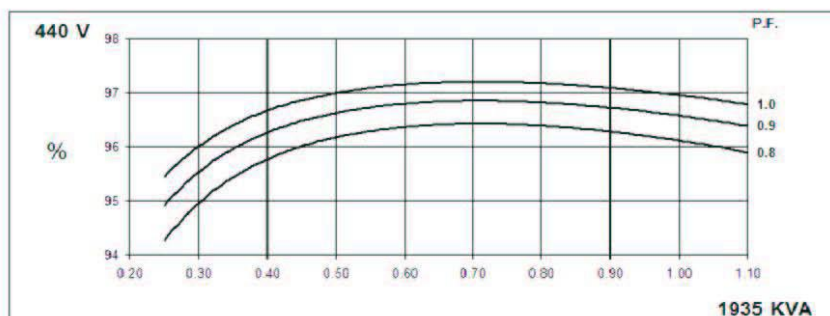
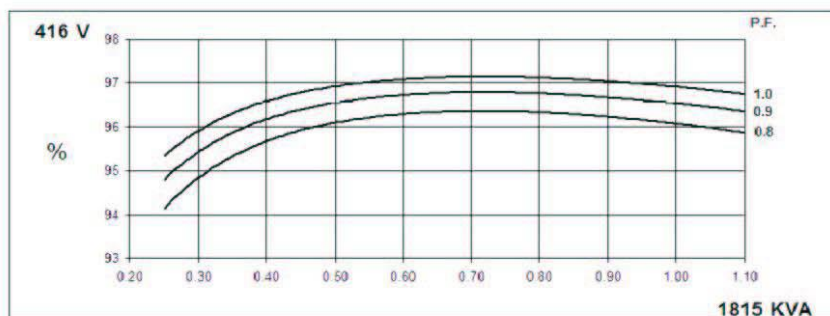
Alternator data sheet

Frame size: P734D

Winding 312

**60
Hz**

THREE PHASE EFFICIENCY CURVES



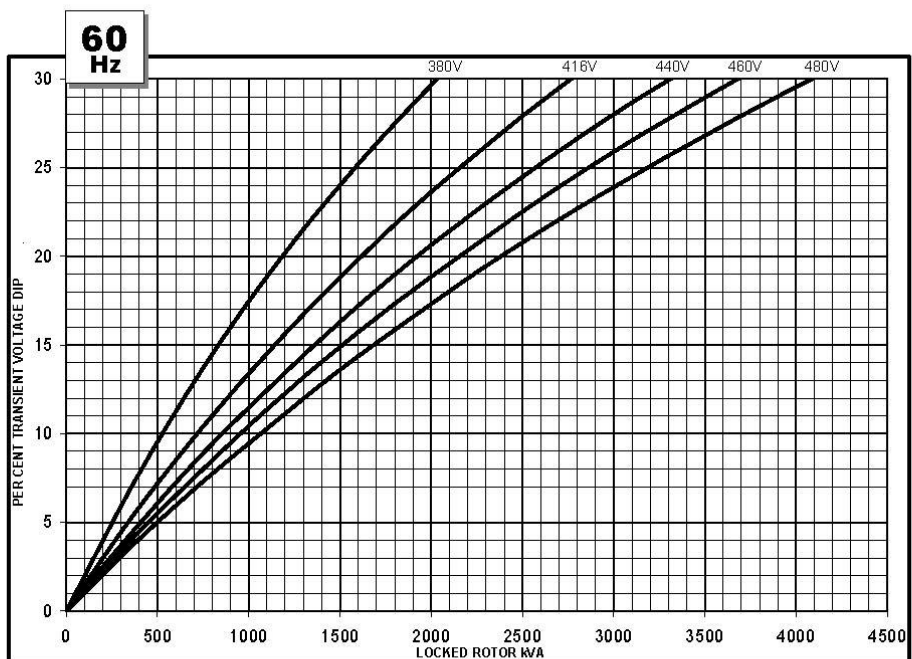
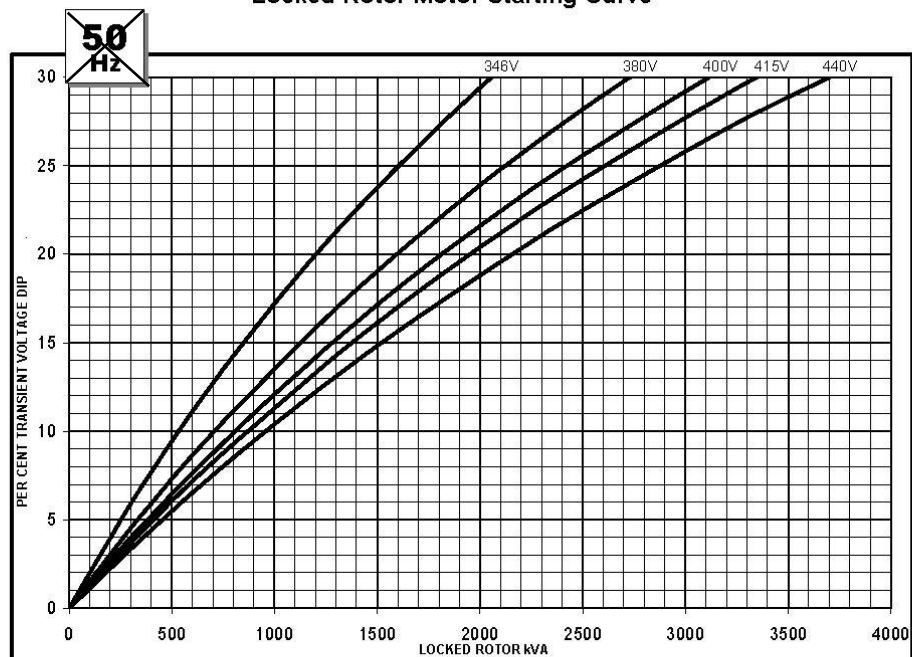


Alternator data sheet

Frame size: P734D

Winding 312

Locked Rotor Motor Starting Curve



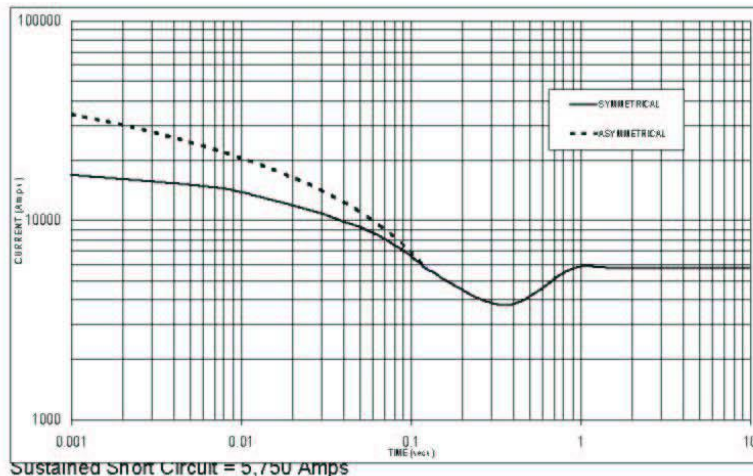


Alternator data sheet

Frame size: P734D

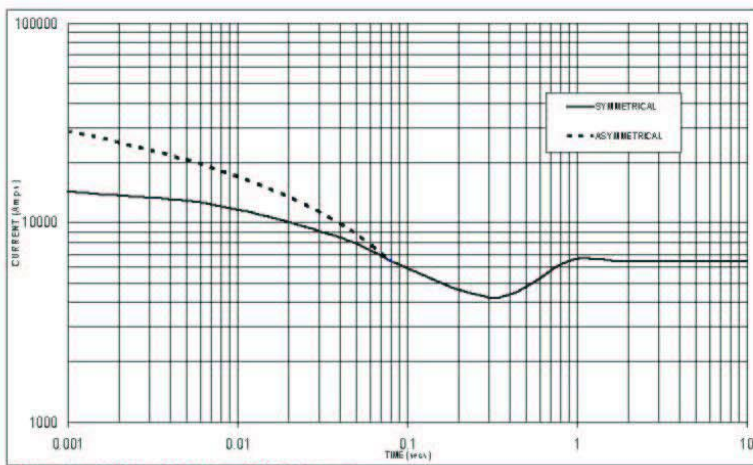
Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed
Based on star (wye) connection.

**50
Hz**



Sustained Short Circuit = 5,750 Amps

**60
Hz**



Sustained Short Circuit = 6,500 Amps

Note 1

The following multiplication factors should be used to adjust the values from curve between time 0.001 seconds and the minimum current point in respect of nominal operating voltage :

50Hz		60Hz	
Voltage	Factor	Voltage	Factor
380v	x 1.00	416v	x 1.00
400v	x 1.05	440v	x 1.06
415v	x 1.09	460v	x 1.10
440v	x 1.16	480v	x 1.15

The sustained current value is constant irrespective of voltage level

Note 2

The following multiplication factor should be used to convert the values calculated in accordance with NOTE 1 to those applicable to the various types of short circuit :

	3-phase	3-phase L-L	1-phase L-N
Instantaneous	x 1.00	x 0.87	x 1.30
Minimum	x 1.00	x 1.80	x 3.20
Sustained	x 1.00	x 1.50	x 2.50
Max. sustained duration	10 sec.	3 sec.	2 sec.

All other times are unchanged

Note 3

Curves are drawn for Star (Wye) connected machines.



2019 EPA Tier 2 Exhaust Emission Compliance Statement 1500DQGAB Stationary Emergency 60 Hz Diesel generator set

Compliance Information:

The engine used in this generator set complies with Tier 2 emissions limit of U.S. EPA New Source Performance Standards for stationary non-emergency engines under the provisions of 40 CFR 60 Subpart IIII when tested per ISO8178 D2.

Engine Manufacturer: Cummins Inc.
EPA Certificate Number: KCEXL050.AAD-014
Effective Date: 10/01/2018
Date Issued: 10/01/2018
EPA Engine Family (Cummins Emissions Family): KCEXL050.AAA

Engine Information:

Model: QSK50 / QSK50-G / QSK50-G4 NR2 Bore: 6.25 in. (159 mm)
Engine Nameplate HP: 2220 Stroke: 6.25 in. (159 mm)
Type: 4 Cycle, 60°V, 16 Cylinder Diesel Displacement: 3067 cu. in. (50.3 liters)
Aspiration: Turbocharged & CAC Compression Ratio: 15.0:1
Emission Control Device: Electronic Control Exhaust Stack Diameter: 2 – 10 in.

Diesel Fuel Emissions Limits

D2 cycle exhaust emissions

	Grams per BHP-hr			Grams per kW _m -hr		
	<u>NO_x + NMHC</u>	<u>CO</u>	<u>PM</u>	<u>NO_x + NMHC</u>	<u>CO</u>	<u>PM</u>
Test Results	4.6	0.9	0.06	6.1	1.2	0.08
EPA Emissions Limit	4.8	2.6	0.15	6.4	3.5	0.20

Test methods: EPA nonroad emissions recorded per 40 CFR 89 (ref. ISO8178-1) and weighted at load points prescribed in Subpart E, Appendix A for constant speed engines (ref. ISO8178-4, D2)

Diesel fuel specifications: Cetane number: 40-48. Reference: ASTM D975 No. 2-D, 300-500 ppm Sulfur.

Reference conditions: Air inlet temperature: 25°C (77°F), Fuel inlet temperature: 40°C (104°F). Barometric pressure: 100 kPa (29.53 in Hg), Humidity: 10.7 g/kg (75 grains H₂O/lb) of dry air; required for NO_x correction, Restrictions: Intake restriction set to a maximum allowable limit for clean filter; Exhaust back pressure set to a maximum allowable limit.

Tests conducted using alternate test methods, instrumentation, fuel or reference conditions can yield different results. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.



High Ambient Air Temperature Radiator Cooling System

	Duty	Rating (kW)	Max Cooling @ Air Flow Static Restriction, Unhoused (inches water/mm water)					Housed in Free Air, No Air Discharge Restriction			
			0.0/0.0	0.25/6.4	0.5/12.7	0.75/19.1	1.0/25.4				
			Maximum Allowable Ambient Temperature, Degree C								
60 Hz	Standby	1500	45.7	44.4	43.2	39.4	37.8	N/A	N/A	N/A	N/A
	Prime	1350	46.1	44.7	43.4	41.1	39.7	N/A	N/A	N/A	N/A
	Continuous		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
50 Hz	Standby		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Prime		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Continuous		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Enhanced High Ambient Air Temperature Radiator Cooling System

	Duty	Rating (kW)	Max Cooling @ Air Flow Static Restriction, Unhoused (inches water/mm water)					Housed in Free Air, No Air Discharge Restriction			
			0.0/0.0	0.25/6.4	0.5/12.7	0.75/19.1	1.0/25.4				
			Maximum Allowable Ambient Temperature, Degree C								
	Standby	1500	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
60 Hz	Prime	1350	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Continuous		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Standby		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
50 Hz	Prime		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Continuous		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

1. Data shown are anticipated cooling performance for typical generator set.
2. Cooling data is based on 1000 ft (305 m) site test location.
3. Generator set power output may need to be reduced at high ambient conditions. Consult generator set data sheet for derate schedules.
4. Cooling performance may be reduced due to several factors including but not limited to: Incorrect installation, improper operation, fouling of the cooling system, and other site installation variables.



Sound Pressure Level @ 7 meters, dB(A)

See Notes 1-8 listed below

Configuration		Measurement Location Number								Average
		1	2	3	4	5	6	7	8	
Standard - Unhoused	Infinite Exhaust	100.4	96.8	95.3	96.6	93.4	96.3	94.2	99.0	97.1

Sound Power Level, dB(A)

See Notes 2-6, 9, 10 listed below

Configuration		Octave Band Center Frequency (Hz)								Overall Sound Power Level
		63	125	250	500	1000	2000	4000	8000	
Standard - Unhoused	Infinite Exhaust	82.5	101.1	119.3	119.5	117.5	114.9	109.7	108.0	124.5

Exhaust Sound Power Level, dB(A)

Open Exhaust (No Muffler Rated Load)	Octave Band Center Frequency (Hz)								Sound Power Level
	63	125	250	500	1000	2000	4000	8000	
	94.6	118.5	123.4	128.1	126.6	128.6	126.9	125.7	

Note:

- Position 1 faces the engine front. The positions proceed around the generator set in a counter-clockwise direction in 45° increments. All positions are at 7m (23 ft) from the surface of the generator set and 1.2m (48") from floor level.
- Sound levels are subject to instrumentation, measurement, installation and manufacturing variability.
- Sound data with remote-cooled generator sets are based on rated loads without cooling fan noise.
- Sound levels for aluminum enclosures are approximately 2 dB(A)s higher than listed sound levels for steel enclosures.
- Sound data for generator set with infinite exhaust do not include exhaust noise.
- Data is based on full rated load with standard radiator-cooling fan package
- Sound Pressure Levels are measured per ANSI S1.13 and ANSI S12.18, as applicable.
- Reference sound pressure is 20 µPa.
- Sound Power Levels per ISO 3744 and ISO 8528-10, as applicable.
- Reference power = 1 pw (10⁻¹² W)
- Exhaust Sound Pressure Levels are per ISO 6798, as applicable.

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-179646	L	1	RMV NOTE 7	JCV	PJL	P. LANNAN	16AUG18
		2	SEE SHEET 2	JCV	PJL	P. LANNAN	16AUG18
		3	SEE SHEET 2	JCV	PJL	P. LANNAN	16AUG18

FOR TERMINAL LOAD
CONNECTION DETAIL
SEE SHEET 4

CONTROL BOX
OPTION: H609-2
MOUNTED ON LEFT
SIDE
NOTE 2 & 3

FUEL STUB UP
356 X 787 [14.0 X 31.0]

EXHAUST OUTLETS
149 ID [5.9] X 203 OD [8.0]
8X Ø11.2 [4.4] HOLES EQUALLY
SPACED ON A Ø182 [7.2] BC

2X 66
[2.6]

2023
[79.6]

12
[0.5]

2571
[101.2]

2196
[86.5]

1689
[66.5]

155
[6.1]

AIR FLOW

2000
[78.7]

1603
[63.1]
SKID
WIDTH

CRANK

638
[25.1]

801
[31.6]

920
[36.2]

59
[2.3]

409
[16.1]

BATTERIES (OPT)

RADIATOR FILL

33
[1.3]

1537
[60.5]

2X 287
[11.3]

2X 77
[3]

CONTROL BOX
OPTION: H679-2
MOUNTED ON FRONT
NOTE 3

ELECTRICAL LOWER STUB UP
287 X 1153 [11 X 45] BOTH SIDES
FOR ENTRY/BREAKER BOX
APPLICATIONS, SEE APPLICABLE
CIRCUIT BREAKER OUTLINE DRAWING

CONTROL BOX
OPTION: H608-2
MOUNTED ON RIGHT
SIDE
NOTE 2 & 3

2159
[85]

51
[2]

Ø101.6 [4]
LIFTING HOLES

OIL FILL
OIL CHECK

Ø101.6 [4]
LIFTING HOLES

COOLANT DRAIN

2X 588
[23.2]

5956
[234.5]

3975
[156.5]

1914
[75.4]

1862
[73.3]

763
[30]

78
[3.07]

2840
[111.8]

16X 9.5 X 16 SLOT

645
[25.4]

NOTE 4

921
[36.3]

102.7
[4]

921
[36.3]

248.4
[9.8]

1950
[76.8]

801
[31.5]

2000
[78.7]

660
[26]

8X Ø9.5
[0.4]

115
[4.5]

195
[7.7]

330
[13]

330
[13]

195
[7.7]

330
[13]

309
[12.1]

314
[12.4]

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS			
DIM	X	±	HOLE
	X	± 1	0.00- 4.99 +0.15/-0.08
	.X	± 0.8	5.00- 9.99 +0.20/-0.10
	.XX	± 0.38	10.00-17.49 +0.25/-0.13
			17.50-24.99 +0.30/-0.13
ANG TOL:	±	1.0°	SCALE: 1/16

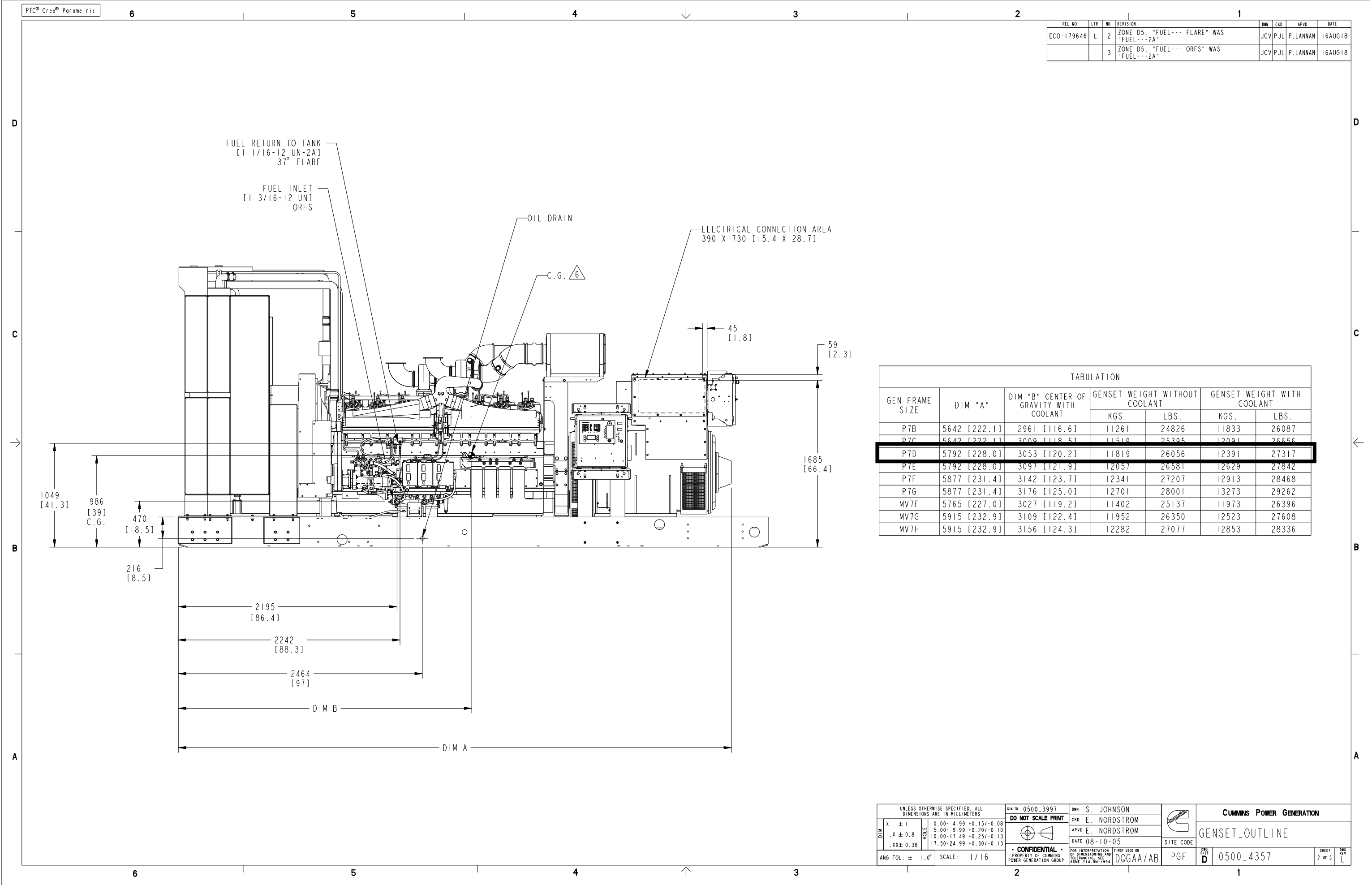
SM NO	0500_3997
DO NOT SCALE PRINT	
CONFIDENTIAL	
PROPERTY OF CUMMINS POWER GENERATION GROUP	

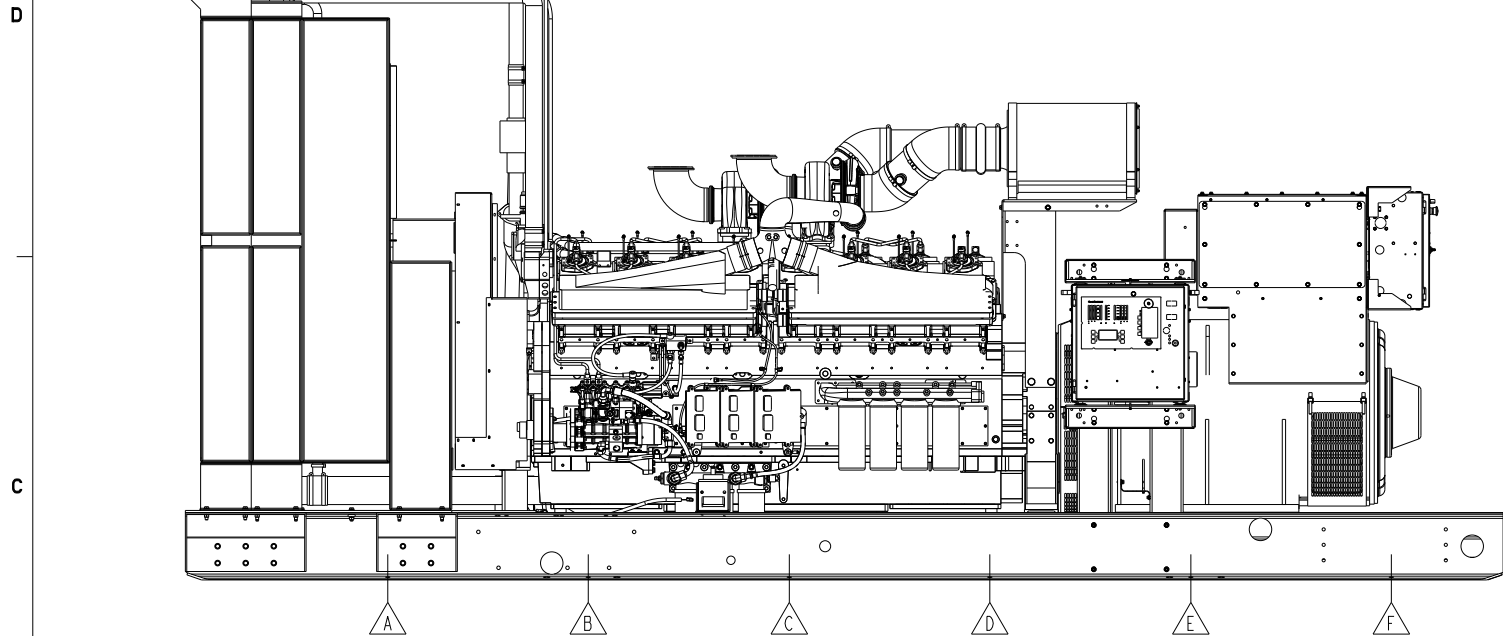
DWN	S. JOHNSON
CKD	E. NORDSTROM
APVD	E. NORDSTROM
DATE	08-10-05
FIRST USED ON	DOGAA/AB
FOR INTERPRETATION OF DIMENSIONS AND TOLERANCING, SEE ASME Y14.5M-1994	


CUMMINS POWER GENERATION			
GENSET_OUTLINE			
SITE CODE	PGF	REV	D
0500_4357		SHEET	1 OF 5

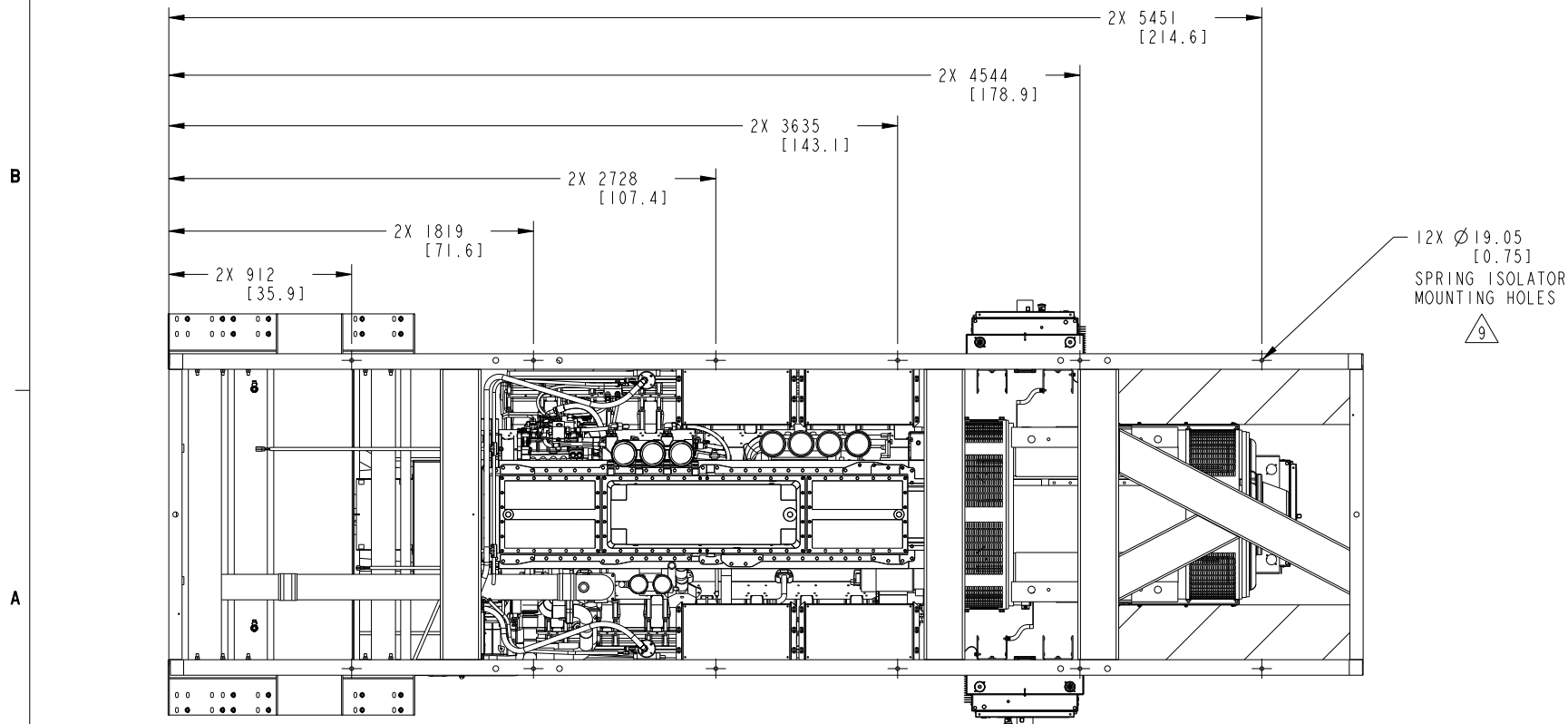
NOTES:



- DIMENSIONS SHOWN IN [] ARE INCHES.
- ONLY ONE OPTION OF H608-2, H609-2, OR H679-2 IS PROVIDED PER CUSTOMER SELECTION.
- OPTION H608-2 & H609-2 FOR MEDIUM VOLTAGE ALTERNATORS ONLY.
- GRILL SUPPLIED WITH RADIATOR. REMOVED IN VIEW FOR DIMENSIONAL CLARITY.
- DO NOT ATTACH SOLID CONDUIT TO CONTROL BOX.
- LATERAL CENTER OF GRAVITY ON CRANKSHAFT CENTERLINE. (SEE SHEET 2)
- (NOTE REMOVED)
- GENSET SHIPPED FILLED WITH ENGINE OIL. OIL SUMP CAPACITY 204 L (54 US GAL).
- FOR SEISMIC ISOLATOR QUANTITY REQUIRED SEE GENSET SEISMIC INSTALLATION DRAWING. (SEE SHEET 3)
- FORCES ARE CALCULATED BASED ON NOMINAL VALUES. (SEE SHEET 3)
- EACH 2 HOLE. NEMA TERMINAL WILL ACCOMODATE UP TO 10 752 MCM LUGS. (SEE SHEET 4)





STATIC ISOLATOR FORCES						
GEN FRAME SIZE	FORCE (N) BASED ON ISOLATOR A046D208 - 630.5 N/mm 					
	A	B	C	D	E	F
P7B	11686.9	10882.3	10075.8	9271.1	8464.7	7660.0
P7C	11493.9	10850.7	10206.0	9562.8	8918.1	8274.9
P7D	11358.4	10867.3	10375.2	9884.1	9392.0	8900.9
P7E	11147.7	10818.6	10488.8	10159.7	9829.8	9500.7
P7F	10950.0	10792.7	10635.0	10477.7	10320.1	10162.8
P7G	10907.0	10884.5	10861.9	10839.4	10816.9	10794.3
MV7F	11215.4	10644.9	10073.2	9502.7	8930.9	8360.4
MV7G	10938.2	10658.2	10377.6	10097.6	9816.9	9536.9
MV7H	10760.2	10659.2	10557.9	10456.8	10355.5	10254.4



UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS				S/N TO 0500_3997		DWN S. JOHNSON			CUMMINS POWER GENERATION		
DIM	X ± 1	HOLE	0.00- 4.99 +0.15/-0.08		DO NOT SCALE PRINT	CKD E. NORDSTROM	GENSET_OUTLINE				
	.X ± 0.8		5.00- 9.99 +0.20/-0.10								
	.XX ± 0.38		10.00-17.49 +0.25/-0.13			DATE 08-10-05		SITE CODE			
ANG TOL: ± 1.0°				SCALE: 1 / 16		- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING SEE ASME Y14.5M-1994		FIRST USED ON DOGAA/AB	
								PGF		DWG SITE D 0500_4357	
										SHEET 3 OF 5 DWG REV	

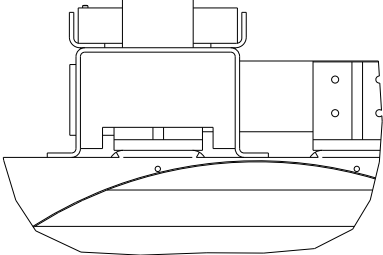
35
[1.4]

80
[3.2]

40
[1.6]

65
[2.6]

Ø17
[0.7]



DETAIL A
SCALE 1/4

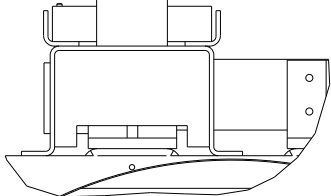
80
[3.2]

40
[1.6]

30
[1.2]

45
[1.8]

Ø17
[0.6693]



DETAIL B
SCALE 1/4

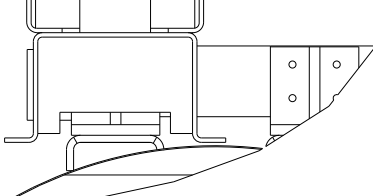
45
[1.8]

18
[0.7]

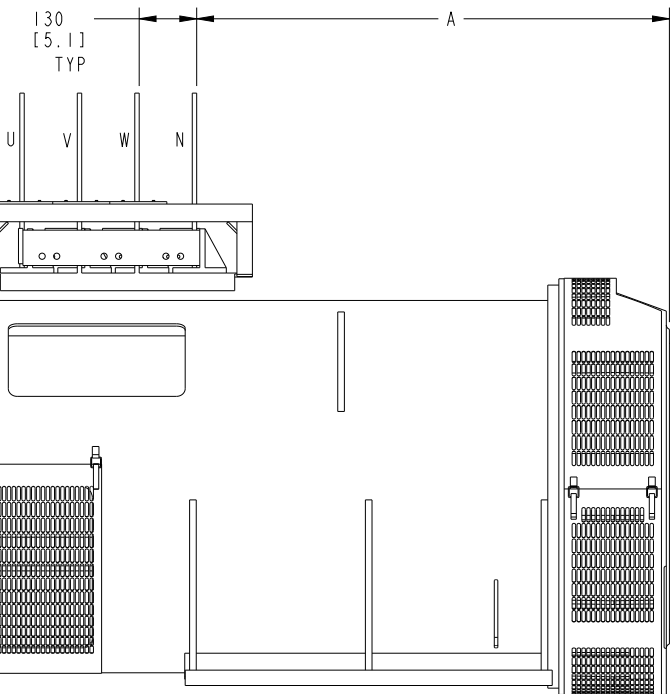
44
[1.7]

80
[3.2]

Ø14
[0.6]



DETAIL C
SCALE 1/4



TABULATION	
CORE	DIM A
B	919
C	919
D	1069
E	1069
F	1154
G	1154

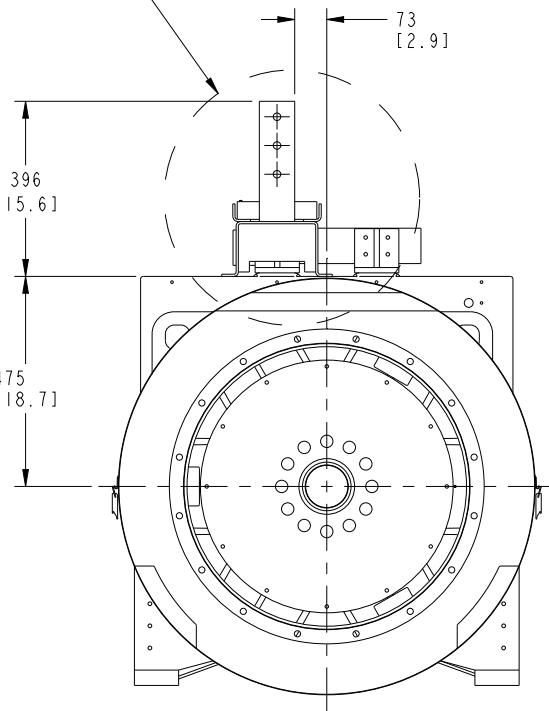
P7 ALTERNATOR
ELECTRICAL CONNECTION DETAIL
(OUTPUT BOX NOT SHOWN)

SEE DETAIL A

73
[2.9]

396
[15.6]

475
[18.7]



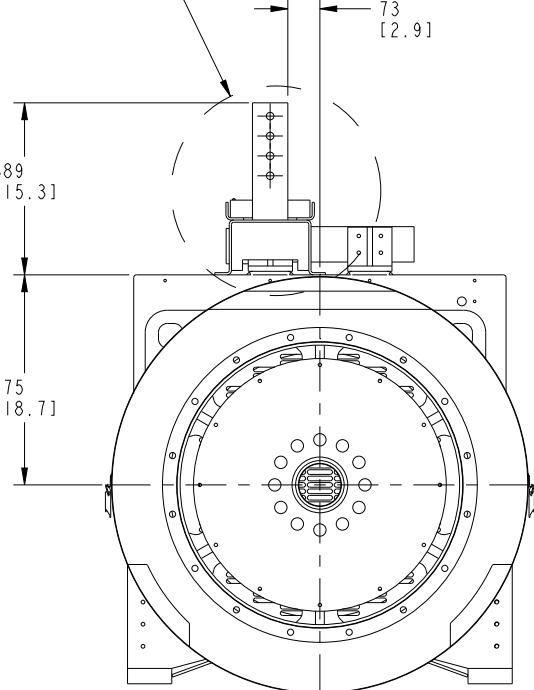
1 HOLE LUG
NEWAGE
CORES B THRU F
(KR79)

SEE DETAIL B

73
[2.9]

389
[15.3]

475
[18.7]



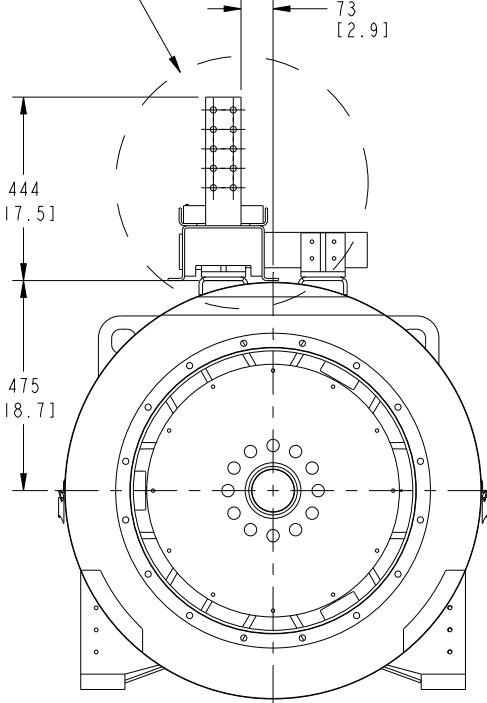
1 HOLE LUG
NEWAGE
CORE G
(KR79)

SEE DETAIL C

73
[2.9]

444
[17.5]

475
[18.7]



2 HOLE LUG, NEMA
CORES B THRU G
(KR78)
UL APPROVED

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS

DIM	X ± 1	HOLE	0.00 - 4.99 +0.15/-0.08
	.X ± 0.8		5.00 - 9.99 +0.20/-0.10
	.XX ± 0.38		10.00 - 17.49 +0.25/-0.13
			17.50 - 24.99 +0.30/-0.13
ANG TOL: ± 1.0°		SCALE: 1/16	

SIM NO 0500_3997

DO NOT SCALE PRINT

CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP

DWN S. JOHNSON

CKD E. NORDSTROM

APVD E. NORDSTROM

DATE 08-10-05

CUMMINS POWER GENERATION

GENSET_OUTLINE

SITE CODE

PGF

DWG NO 0500_4357

SHEET 4 OF 5

DWG REV L




REL NO	LTR	NO	REVISION	ZONE	DWN	CKD	APVD	DATE
ECO-100339	B	1	SEE ECO FOR DETAILS	-	SMM	MT	MT	06-11-08

UL/IEC LUGS					TABLE 1 ACCESSORY SPECIFICATIONS			
LUG	FRAME	MAX AMPS	WIRE RANGE COPPER	DIM D ±25 [1.0]	ACCESSORY DESCRIPTION	CONTACT RATING	INRUSH	CONNECTION TYPE
	SQUARE D NSJ	400A 3 OR 4 POLE	#2-600 KCMIL	554 [21.8]	24 VDC SHUNT TRIP	-----	10A	COMPRESSION TERMINALS #20-16 AWG OR SMALLER TORQUE: 10 LB-IN
	SQUARE D NSJ W/STR23SP TRIP UNIT	600A 3-POLE	2/0-350 KCMIL	554 [21.8]	24 VDC SHUNT TRIP	-----	10A	COMPRESSION TERMINALS #20-16 AWG OR SMALLER TORQUE: 10 LB-IN
	SQUARE D P 800 W/MICROLOGIC 3.0 TRIP UNIT	800A 3-POLE	3/0-500 KCMIL	599 [23.5]	24 VDC SHUNT TRIP	-----	200VA	COMPRESSION TERMINALS FOR 1 OR 2 #18-14 AWG. TORQUE: 10 LB-IN
	SQUARE D P 1200 W/MICROLOGIC 3.0 TRIP UNIT	1200A 3-POLE	3/0-500 KCMIL	556 [21.8]	24 VDC SHUNT TRIP	-----	200VA	COMPRESSION TERMINALS FOR 1 OR 2 #18-14 AWG. TORQUE: 10 LB-IN
	SQUARE D R 2500/2000/1600 3-POLE 1600-2500 AMP BUS BARS STANDARD W/MICROLOGIC 3.0 TRIP UNIT		NEMA HOLE PATTERN	490 [19]	24 VDC SHUNT TRIP	-----	200VA	COMPRESSION TERMINALS FOR 1 OR 2 #18-14 AWG. TORQUE: 10 LB-IN
	R 2500/2000/1600 W/OPTIONAL LUG 1600-2500 AMP BREAKERS TORQUE 375 IN LBS [42 Nm]		#2-600 KCMIL	490 [19]	24 VDC SHUNT TRIP	-----	200VA	COMPRESSION TERMINALS FOR 1 OR 2 #18-14 AWG. TORQUE: 10 LB-IN
					1 EA. FORM C 4 AUX CONTACT + 1 TRIP ALARM	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 48 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	----	COMPRESSION TERMINALS FOR 1 OR 2 #18-16 AWG. TORQUE: 10 LB-IN
					1 EA. FORM C 4 AUX CONTACT + 1 TRIP ALARM	6A AT 240 VAC, 6A AT 480 VAC, 3A AT 600 VAC, 2.5A AT 48 VDC, 0.8A AT 125VDC, 0.3A AT 250 VDC	----	COMPRESSION TERMINALS FOR 1 OR 2 #18-16 AWG. TORQUE: 10 LB-IN

TABLE 2 TYPICAL CONDUIT AND WIRE SIZE BASED ON NEC 2008, ARTICLE 310.15 AT 75C TEMPERATURE RATED CONDUCTOR AT 30C AMBIENT AND ANNEX C (LIQUID TIGHT FLEXIBLE METAL CONDUIT - LFMC)					
MAX BRKR AMPS	WIRE (COPPER)		CABLE AMPACITY	TOTAL NUMBER OF CONDUITS	
	QTY	SIZE		QTY	SIZE (IN INCHES)
2500	6	600 KCMIL	420	6	4
2000	5	600 KCMIL	420	5	4
1600	5	600 KCMIL	420	5	4
1200	3	500 KCMIL	385	3	3
1000	3	400 KCMIL	335	3	3
800	2	300 KCMIL	285	2	3
630	2	350 KCMIL	310	2	3
600	2	350 KCMIL	310	2	3
400	1	600 KCMIL	420	1	4
250	1	250 KCMIL	255	1	2 1/2
100	1	2 KCMIL	115	1	2

TYPICAL CONDUIT AND WIRE SIZE BASED ON NEC 2008, ARTICLE 310.15 AND TABLE 310-16 AT 75C TEMPERATURE RATED CONDUCTOR AT 40C AMBIENT AND ANNEX C (LIQUID TIGHT FLEXIBLE METAL CONDUIT - LFMC)					
MAX BRKR AMPS	WIRE (COPPER)		CABLE AMPACITY	TOTAL NUMBER OF CONDUITS	
	QTY	SIZE		QTY	SIZE (IN INCHES)
2500	6	750 KCMIL	418	6	4
2000	5	700 KCMIL	405	5	4
1600	4	700 KCMIL	405	4	4
1000	3	500 KCMIL	334	3	3 1/2
800	3	350 KCMIL	273	3	3

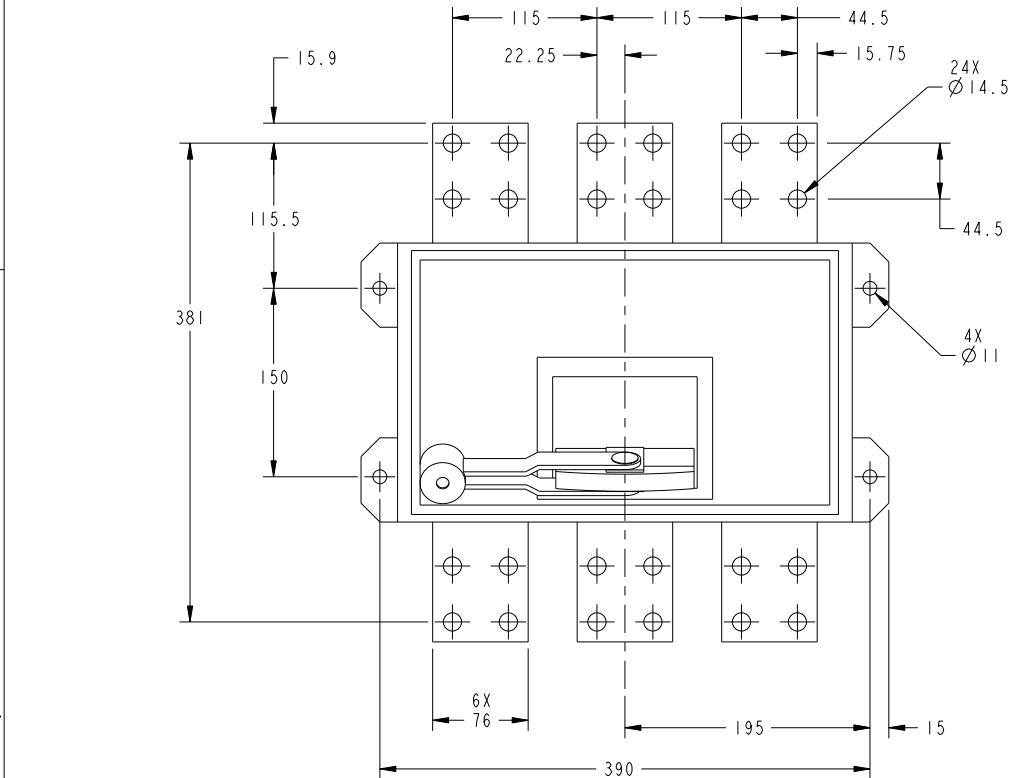
TABLE 3			
GENSET MODEL	ALTERNATOR MODEL	DIM "A"	DIM "B"
<input type="checkbox"/> DFLB <input type="checkbox"/> DFLC <input type="checkbox"/> DFLE <input type="checkbox"/> DOGAA <input checked="" type="checkbox"/> DOGAB	<input type="checkbox"/> P734B	247.6 [9.75]	569.8 [22.43]
	<input type="checkbox"/> P734C	247.6 [9.75]	569.8 [22.43]
	<input checked="" type="checkbox"/> P734D	98.6 [3.89]	420.8 [16.57]
	<input type="checkbox"/> P734E	98.6 [3.89]	420.8 [16.57]
	<input type="checkbox"/> P734F	3.6 [.14]	325.8 [12.83]
	<input type="checkbox"/> P734G	3.6 [.14]	325.8 [12.83]

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS				QTY	ITEM	PART NO	DESCRIPTION OR MATERIAL								
DIM	X ± 3	0.00- 4.99 +0.15/-0.08		SIM TO	DO NOT SCALE PRINT	DWN	LANDRUS		CUMMINS POWER GENERATION						
	.X ± 0.8	5.00- 9.99 +0.20/-0.10				CRD	L.NAVARRETE		1400 73RD AVENUE NE, MINNEAPOLIS, MN 55432						
	.XX ± 0.38	10.00-17.49 +0.25/-0.13				APVD	L.NAVARRETE		CIRCUIT BRKR OUTLINE						
		17.50-24.99 +0.30/-0.13				DATE	12-15-08		(50 LITER)						
ANG TOL: ± 1.0°				SCALE: 3/64		FOR INTERPRETATION OF DIMENSIONS AND TOLERANCING, SEE ASME Y14.5M-1994			SITE CODE	PGF	D	0500-4537	SHEET 3 of 3	DWG NO	
						D									
						D									
						D									

CIRCUIT BRKR OUTLINE
(50 LITER)

Pro/ENGINEER

REL NO	LTR	NO	REVISION	ZONE	DR	CHKR	APPROVED	DATE
ECO-103185	H	1	ADD P/N A029B150 & A029B151	-	DA	DA	PL	07JAN09
		2	UPDATED NOTES	-	DA	DA	PL	07JAN09



TABULATION	
PART NO.	CURRENT_ER
0320_2164_01	FRD26895
0320_2164_02	FRD26895
0320_2164_03	FRD26895
0320_2164_04	FRD26895
0320_2164_05	FRD26895
0320_2164_06	FRD26895
0320_2164_07	FRD27516
A029B150	ECO-103185
A029B151	ECO-103185

BREAKER SIZE	TERMINAL THICKNESS "A"	
	mm	[IN]
1600 A	12.8	[0.50]
2000 A	16.0	[0.63]
2500 A	20.0	[0.79]
3000 A	20.0	[0.79]

NOTES:

- THIS PART IS MANUFACTURING SOURCE CONTROLLED.
- ELECTRONIC TRIP CIRCUIT BREAKER. STANDARD MICROLOGIC 3.0 TRIP UNIT. (L1)
FOR 0320_2164_07, ELECTRONIC MICROLOGIC TRIP UNIT IS 6.0A (LSIG).
- BREAKERS TO BE SUPPLIED WITH TYPE F PLUG.

TYPE F PLUG AMPERAGE SETTINGS									
TYPE F	84%	86%	88%	90%	92%	94%	96%	98%	100%
-01	2100	2150	2200	2250	2300	2350	2400	2450	2500
-02	1680	1720	1760	1800	1840	1880	1920	1960	2000
-03	1344	1376	1408	1440	1472	1504	1536	1568	1600

BREAKERS TO BE SUPPLIED WITH TYPE A PLUG.

TYPE A PLUG AMPERAGE SETTINGS									
TYPE A	40%	45%	50%	60%	63%	70%	80%	90%	100%
-07	640	720	800	960	1008	1120	1280	1440	1600
A029B150	1200	1350	1500	1800	1890	2100	2400	2700	3000

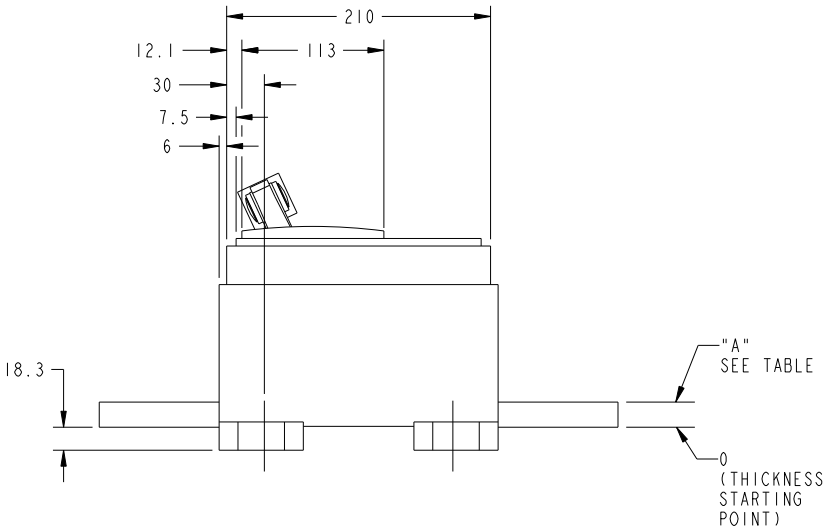
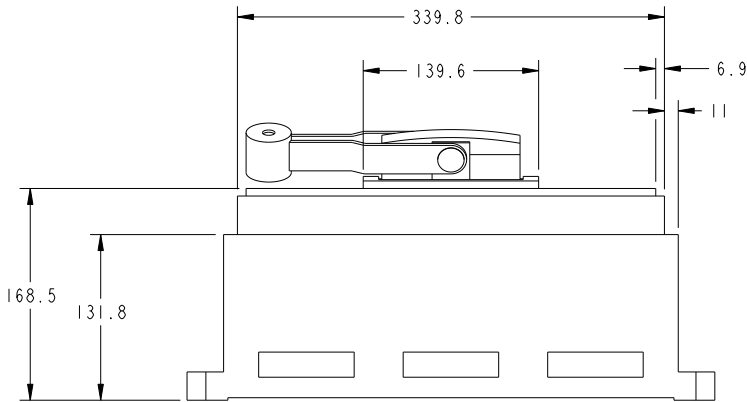
- BREAKERS TO BE SUPPLIED WITH NO LUGS (AS SHOWN).
- AGENCIES: 3 POLE UL LISTED IEC
- INTERRUPTING RATING

CIRCUIT BREAKER	UL/CSA RATING (60 Hz)			IEC 60947-2 RATING (50/60 Hz)			
	240 Vac	480 Vac	600 Vac	240 Vac	380/415 Vac		
RL	125 kA	100 kA	50 kA	Icu	Ics	Icu	Ics
	125 kA	100 kA	50 kA	125 kA	65 kA	85 kA	45 kA

- LEVEL OF OPERATION ABOVE 80% CONTINUOUS LOAD REQUIRES SPECIAL TESTING, INSTALLATION AND APPLICATION REQUIREMENTS PER VENDOR LITERATURE.

PRODUCTION P/N	BREAKER	POLES	RATINGS	PLUG TYPE
0320_2164_01	RL2500	3	SEE NOTE 6	F
0320_2164_02	RL2000	3	SEE NOTE 6	F
0320_2164_03	RL1600	3	SEE NOTE 6	F
0320_2164_07	RL1600	3	SEE NOTE 6	A
A029B150	RL3000	3	SEE NOTE 6	A

ACCESSORIES P/N	BREAKER	POLES	MATERIAL
0320_2164_04	RL2500	3	0320_2164_01
0320_2164_05	RL2000	3	0320_2164_02
0320_2164_06	RL1600	3	0320_2164_03
A029B151	RL3000	3	A029B150



-THIS IS A CONTROLLED PRODUCT-
PER ONAN PROCEDURE FRE-1002
TO MAINTAIN COMPLIANCE WITH REQUIREMENTS OF THE CODES, STANDARDS, OR AGENCIES LISTED BELOW
☒ CSA ☒ UL ☐ IEC ☐ NFPA ☐ ABYC
☐ OTHER ☐ OTHER
AND/OR ASSIGN INTERNAL ONAN DESIGN CONTROL FACILITIES
CHANGES, DEVIATIONS, OR SUBSTITUTIONS OF MATERIAL, PROCESS, OR PERFORMANCE FOR THIS PRODUCT MUST BE APPROVED BY THE FOLLOWING DESIGN CONTROL FACILITIES
DESIGN CONTROL FACILITY: _____
DESIGN CONTROL FACILITY: _____

										ITEM	PART NO	AWS SIZE	DESCRIPTION OR MATERIAL	REF DES
TOLERANCE UNLESS OTHERWISE SPECIFIED										SIM TO	NAME	DATE		
mm										1/16 in	COPIED	D CRANE	03-21-03	
.015 ± .008										.015 ± .008	.015 ± .008	DR	03-21-03	
.030 ± .015										.030 ± .015	.030 ± .015	MFG	03-21-03	
.075 ± .038										.075 ± .038	.075 ± .038	APPROVED	E.CZECHOWSKI	03-21-03
.150 ± .075										.150 ± .075	.150 ± .075	H06F/HC7	SITE CODE	TITLE
.300 ± .150										.300 ± .150	.300 ± .150	H06F/HC7	PGA	CIRCUIT-BREAKER
.600 ± .300										.600 ± .300	.600 ± .300	H06F/HC7	PGA	CIRCUIT-BREAKER
1.200 ± .600										1.200 ± .600	1.200 ± .600	H06F/HC7	PGA	CIRCUIT-BREAKER
2.400 ± 1.200										2.400 ± 1.200	2.400 ± 1.200	H06F/HC7	PGA	CIRCUIT-BREAKER
4.800 ± 2.400										4.800 ± 2.400	4.800 ± 2.400	H06F/HC7	PGA	CIRCUIT-BREAKER
9.600 ± 4.800										9.600 ± 4.800	9.600 ± 4.800	H06F/HC7	PGA	CIRCUIT-BREAKER
19.2 ± 9.6										19.2 ± 9.6	19.2 ± 9.6	H06F/HC7	PGA	CIRCUIT-BREAKER
38.4 ± 19.2										38.4 ± 19.2	38.4 ± 19.2	H06F/HC7	PGA	CIRCUIT-BREAKER
76.8 ± 38.4										76.8 ± 38.4	76.8 ± 38.4	H06F/HC7	PGA	CIRCUIT-BREAKER
153.6 ± 76.8										153.6 ± 76.8	153.6 ± 76.8	H06F/HC7	PGA	CIRCUIT-BREAKER
307.2 ± 153.6										307.2 ± 153.6	307.2 ± 153.6	H06F/HC7	PGA	CIRCUIT-BREAKER
614.4 ± 307.2										614.4 ± 307.2	614.4 ± 307.2	H06F/HC7	PGA	CIRCUIT-BREAKER
1228.8 ± 614.4										1228.8 ± 614.4	1228.8 ± 614.4	H06F/HC7	PGA	CIRCUIT-BREAKER
2457.6 ± 1228.8										2457.6 ± 1228.8	2457.6 ± 1228.8	H06F/HC7	PGA	CIRCUIT-BREAKER
4915.2 ± 2457.6										4915.2 ± 2457.6	4915.2 ± 2457.6	H06F/HC7	PGA	CIRCUIT-BREAKER
9830.4 ± 4915.2										9830.4 ± 4915.2	9830.4 ± 4915.2	H06F/HC7	PGA	CIRCUIT-BREAKER
19660.8 ± 9830.4										19660.8 ± 9830.4	19660.8 ± 9830.4	H06F/HC7	PGA	CIRCUIT-BREAKER
39321.6 ± 19660.8										39321.6 ± 19660.8	39321.6 ± 19660.8	H06F/HC7	PGA	CIRCUIT-BREAKER
78643.2 ± 39321.6										78643.2 ± 39321.6	78643.2 ± 39321.6	H06F/HC7	PGA	CIRCUIT-BREAKER
157286.4 ± 78643.2										157286.4 ± 78643.2	157286.4 ± 78643.2	H06F/HC7	PGA	CIRCUIT-BREAKER
314572.8 ± 157286.4										314572.8 ± 157286.4	314572.8 ± 157286.4	H06F/HC7	PGA	CIRCUIT-BREAKER
629145.6 ± 314572.8										629145.6 ± 314572.8	629145.6 ± 314572.8	H06F/HC7	PGA	CIRCUIT-BREAKER
1258291.2 ± 629145.6										1258291.2 ± 629145.6	1258291.2 ± 629145.6	H06F/HC7	PGA	CIRCUIT-BREAKER
2516582.4 ± 1258291.2										2516582.4 ± 1258291.2	2516582.4 ± 1258291.2	H06F/HC7	PGA	CIRCUIT-BREAKER
5033164.8 ± 2516582.4										5033164.8 ± 2516582.4	5033164.8 ± 2516582.4	H06F/HC7	PGA	CIRCUIT-BREAKER
10066329.6 ± 5033164.8										10066329.6 ± 5033164.8	10066329.6 ± 5033164.8	H06F/HC7	PGA	CIRCUIT-BREAKER
20132659.2 ± 10066329.6										20132659.2 ± 10066329.6	20132659.2 ± 10066329.6	H06F/HC7	PGA	CIRCUIT-BREAKER
40265318.4 ± 20132659.2										40265318.4 ± 20132659.2	40265318.4 ± 20132659.2	H06F/HC7	PGA	CIRCUIT-BREAKER
80530636.8 ± 40265318.4										80530636.8 ± 40265318.4	80530636.8 ± 40265318.4	H06F/HC7	PGA	CIRCUIT-BREAKER
161061273.6 ± 80530636.8										161061273.6 ± 80530636.8	161061273.6 ± 80530636.8	H06F/HC7	PGA	CIRCUIT-BREAKER
322122547.2 ± 161061273.6										322122547.2 ± 161061273.6	322122547.2 ± 161061273.6	H06F/HC7	PGA	CIRCUIT-BREAKER
644245094.4 ± 322122547.2										644245094.4 ± 322122547.2	644245094.4 ± 322122547.2	H06F/HC7	PGA	CIRCUIT-BREAKER
1288490188.8 ± 644245094.4										1288490188.8 ± 644245094.4	1288490188.8 ± 644245094.4	H06F/HC7	PGA	CIRCUIT-BREAKER
2576980377.6 ± 1288490188.8										2576980377.6 ± 1288490188.8	2576980377.6 ± 1288490188.8	H06F/HC7	PGA	CIRCUIT-BREAKER
5153960755.2 ± 2576980377.6										5153960755.2 ± 2576980377.6	5153960755.2 ± 2576980377.6	H06F/HC7	PGA	CIRCUIT-BREAKER
10307921510.4 ± 5153960755.2										10307921510.4 ± 5153960755.2	10307921510.4 ± 5153960755.2	H06F/HC7	PGA	CIRCUIT-BREAKER
20615843020.8 ± 10307921510.4										20615843020.8 ± 10307921510.4	20615843020.8 ± 10307921510.4	H06F/HC7	PGA	CIRCUIT-BREAKER
41231686041.6 ± 20615843020.8										41231686041.6 ± 20615843020.8	41231686041.6 ± 20615843020.8	H06F/HC7	PGA	CIRCUIT-BREAKER
82463372083.2 ± 41231686041.6										82463372083.2 ± 41231686041.6	82463372083.2 ± 41231686041.6	H06F/HC7	PGA	CIRCUIT-BREAKER
164926744166.4 ± 82463372083.2										164926744166.4 ± 82463372083.2	164926744166.4 ± 82463372083.2	H06F/HC7	PGA	CIRCUIT-BREAKER
329853488332.8 ± 164926744166.4										329853488332.8 ± 164926744166.4	329853488332.8 ± 164926744166.4	H06F/HC7	PGA	CIRCUIT-BREAKER
659706976665.6 ± 329853488332.8										659706976665.6 ± 329853488332.8	659706976665.6 ± 329853488332.8	H06F/HC7	PGA	CIRCUIT-BREAKER
1319413953331.2 ± 659706976665.6										1319413953331.2 ± 659706976665.6	1319413953331.2 ± 659706976665.6	H06F/HC7	PGA	CIRCUIT-BREAKER
2638827906662.4 ± 1319413953331.2										2638827906662.4 ± 1319413953331.2	2638827906662.4 ± 1319413953331.2	H06F/HC7	PGA	CIRCUIT-BREAKER
5277655813324.8 ± 2638827906662.4										5277655813324.8 ± 2638827906662.4	5277655813324.8 ± 2638827906662.4	H06F/HC7	PGA	CIRCUIT-BREAKER
10555311626649.6 ± 5277655813324.8										10555311626649.6 ± 5277655813324.8	10555311626649.6 ± 5277655813324.8	H06F/HC7	PGA	CIRCUIT-BREAKER
21110623253299.2 ± 10555311626649.6										21110623253299.2 ± 10555311626649.6	21110623253299.2 ± 10555311626649.6	H06F/HC7	PGA	CIRCUIT-BREAKER
42221246506598.4 ± 21110623253299.2										42221246506598.4 ± 21110623253299.2	42221246506598.4 ± 21110623253299.2	H06F/HC7	PGA	CIRCUIT-BREAKER
84442493013196.8 ± 42221246506598.4										84442493013196.8 ± 42221246506598.4	84442493013196.8 ± 42221246506598.4	H06F/HC7	PGA	CIRCUIT-BREAKER
168884986026393.6 ± 84442493013196.8										168884986026393.6 ± 84442493013196.8	168884986026393.6 ± 84442493013196.8	H06F/HC7	PGA	CIRCUIT-BREAKER
337769972052787.2 ± 168884986026393.6										337769972052787.2 ± 168884986026393.6	337769972052787.2 ± 168884986026393.6	H06F/HC7	PGA	CIRCUIT-BREAKER
675539944105574.4 ± 337769972052787.2										675539944105574.4 ± 337769972052787.2	675539944105574.4 ± 337769972052787.2	H06F/HC7	PGA	CIRCUIT-BREAKER
1351079888211148.8 ± 675539944105574.4										1351079888211148.8 ± 675539944105574.4	1351079888211148.8 ± 675539944105574.4	H06F/HC7	PGA	CIRCUIT-BREAKER
2702159776422297.6 ± 1351079888211148.8										2702159776422297.6 ± 1351079888211148.8	2702159776422297.6 ± 1351079888211148.8	H06F/HC7	PGA	CIRCUIT-BREAKER
5404319552844595.2 ± 2702159776422297.6										5404319552844595.2 ± 2702159776422297.6	5404319552844595.2 ± 2702159776422297.6	H06F/HC7	PGA	CIRCUIT-BREAKER
10808639105689190.4 ± 5404319552844595.2										10808639105689190.4 ± 5404319552844595.2	10808639105689190.4 ± 5404319552844595.2	H06F/HC7	PGA	CIRCUIT-BREAKER
216172782113778380.8 ± 10808639105689190.4										216172782113778380.8 ± 10808639105689190.4	216172782113778380.8 ± 10808639105689190.4	H06F/HC7	PGA	CIRCUIT-BREAKER
432345564227556761.6 ± 216172782113778380.8										432345564227556761.6 ± 216172782113778380.8	432345564227556761.6 ± 216172782113778380.8	H06F/HC7	PGA	CIRCUIT-BREAKER
864691128455113523.2 ± 432345564227556761.6										864691128455113523.2 ± 432345564227556761.6	864691128455113523.2 ± 432345564227556761.6	H06F/HC7	PGA	CIRCUIT-BREAKER
1729382256910270446.4 ± 864691128455113523.2										1729382256910270446.4 ± 864691128455113523.2	1729382256910270446.4 ± 864691128455113523.2	H06F/HC7	PGA	CIRCUIT-BREAKER
3458764513820540892.8 ± 1729382256910270446.4										3458764513820540892.8 ± 1729382256910270446.4	3458764513820540892.8 ± 1729382256910270446.4	H06F/HC7	PGA	CIRCUIT-BREAKER
6917529027641081785.6 ± 3458764513820540892.8										6917529027641081785.6 ± 3458764513820540892.8	6917529027641081785.6 ± 3458764513820540892.8	H06F/HC7	PGA	CIRCUIT-BREAKER
13835058055282163771.2 ± 6917529027641081785.6										13835058055282163771.2 ± 6917529027641081785.6	13835058055282163771.2 ± 6917529027641081785.6	H06F/HC7	PGA	CIRCUIT-BREAKER
27670116110564327542.4 ± 13835058055282163771.2										27670116110564327542.4 ± 13835058055282163771.2	27670116110564327542.4 ± 13835058055282163771.2	H06F/HC7	PGA	CIRCUIT-BREAKER
55340232221128655084.8 ± 27670116110564327542.4										55340232221128655084.8 ± 27670116110564327542.4	55340232221128655084.8 ± 27670116110564327542.4	H06F/HC7	PGA	CIRCUIT-BREAKER
110680464442257110169.6 ± 55340232221128655084.8										110680464442257110169.6 ± 55340232221128655084.8	110680464442257110169.6 ± 55340232221128655084.8	H06F/HC7	PGA	CIRCUIT-BREAKER
221360928884514223339.2 ± 110680464442257110169.6										221360928884514223339.2 ± 110680464442257110169.6	221360928884514223339.2 ± 110680464442257110169.6	H06F/HC7	PGA	CIRCUIT-BREAKER
442721857769028446678.4 ± 221360928884514223339.2										442721857769028446678.4 ± 221360928884514223339.2	442721857769028446678.4 ± 221360928884514223339.2	H06F/HC7	PGA	CIRCUIT-BREAKER
88544371553805689336.8 ± 442721857769028446678.4										88544371553805689336.8 ± 442721857769028446678.4	88544371553805689336.8 ± 442721857769028446678.4	H06F/HC7	PGA	CIRCUIT-BREAKER
1770887431076113786673.6 ± 88544371553805689336.8										1770887431076113786673.6 ± 88544371553805689336.8	1770887431076113786673.6 ± 88544371553805689336.8	H06F/HC7	PGA	CIRCUIT-BREAKER
3541774862152227573347.2 ± 1770887431076113786673.6										3541774862152227573347.2 ± 1770887431076113786673.6	3541774862152227573347.2 ± 1770887431076113786673.6	H06F/HC7	PGA	CIRCUIT-BREAKER
7083549724304455146694.4 ± 3541774862152227573347.2										7083549724304455146694.4 ± 3541774862152227573347.2	7083549724304455146694.4 ± 3541774862152227573347.2	H06F/HC7	PGA	CIRCUIT-BREAKER
14167099448608910293388.8 ± 7083549724304455146694.4										14167099448608910293388.8 ± 7083549724304455146694.4	14167099448608910293388.8 ± 7083549724304455146694.4	H06F/HC7	PGA	CIRCUIT-BREAKER
28334198897217820586777.6 ± 14167099448608910293388.8										28334198897217820586777.6 ± 14167099448608910293388.8	28334198897217820586777.6 ± 14167099448608910293388.8	H06F/HC7	PGA	CIRCUIT-BREAKER
56668397794435641173555.2 ± 28334198897217820586777.6										56668397794435641173555.2 ± 28334198897217820586777.6	56668397794435641173555.2 ± 28334198897217820586777.6	H06F/HC7	PGA	CIRCUIT-BREAKER
1133367955888712832711110.4 ± 56668397794435641173555.2										1133367955888712832711110.4 ± 56668397794435641173555.2	1133367955888712832711110.4 ± 56668397794435641173555.2	H06F/HC7	PGA	CIRCUIT-BREAKER
226673591177742566542220.8 ±														

PowerPact™ M-, P- and R-Frame, and Compact™ NS630b–NS3200 Circuit Breakers

Section 5—PowerPact R-Frame Circuit Breakers

Table 50: UL/IEC Rated, Unit-Mount, Manually-Operated, 100%-Rated Electronic Trip Circuit Breakers with Micrologic™ Electronic Trip Units—1600 A to 3000 A

Trip Unit Type	Circuit Breaker Catalog Number ¹			
	Current Rating (Sensor Rating)			
	1600 A	2000 A	2500 A	3000 A
Micrologic Standard Trip Unit Interchangeable, 3P, 4P				
3.0 (LI)	RGF36160CU31A	RGF36200CU31A	RGF36250CU31A	RGF36300CU31A
	RJF36160CU31A	RJF36200CU31A	RJF36250CU31A	RJF36300CU31A
	RKF36160CU31A	RKF36200CU31A	RKF36250CU31A	RKF36300CU31A
	RLF36160CU31A	RLF36200CU31A	RLF36250CU31A	RLF36300CU31A
5.0 (LSI)	RGF36160CU33A	RGF36200CU33A	RGF36250CU33A	RGF36300CU33A
	RJF36160CU33A	RJF36200CU33A	RJF36250CU33A	RJF36300CU33A
	RKF36160CU33A	RKF36200CU33A	RKF36250CU33A	RKF36300CU33A
	RLF36160CU33A	RLF36200CU33A	RLF36250CU33A	RLF36300CU33A
Micrologic Ammeter Trip Unit ² Interchangeable, 3P, 4P				
3.0A (LI)	RGF36160CU41A	RGF36200CU41A	RGF36250CU41A	RGF36300CU41A
	RJF36160CU41A	RJF36200CU41A	RJF36250CU41A	RJF36300CU41A
	RKF36160CU41A	RKF36200CU41A	RKF36250CU41A	RKF36300CU41A
	RLF36160CU41A	RLF36200CU41A	RLF36250CU41A	RLF36300CU41A
5.0A (LSI)	RGF36160CU43A	RGF36200CU43A	RGF36250CU43A	RGF36300CU43A
	RJF36160CU43A	RJF36200CU43A	RJF36250CU43A	RJF36300CU43A
	RKF36160CU43A	RKF36200CU43A	RKF36250CU43A	RKF36300CU43A
	RLF36160CU43A	RLF36200CU43A	RLF36250CU43A	RLF36300CU43A
6.0A (LSIG)	RGF36160CU44A	RGF36200CU44A	RGF36250CU44A	RGF36300CU44A
	RJF36160CU44A	RJF36200CU44A	RJF36250CU44A	RJF36300CU44A
	RKF36160CU44A	RKF36200CU44A	RKF36250CU44A	RKF36300CU44A
	RLF36160CU44A	RLF36200CU44A	RLF36250CU44A	RLF36300CU44A
Micrologic Power Trip Unit with Modbus® Communications Interchangeable, 3P, 4P				
5.0P (LSI)	RGF36160CU63AE1	RGF36200CU63AE1	RGF36250CU63AE1	RGF36300CU63AE1
	RJF36160CU63AE1	RJF36200CU63AE1	RJF36250CU63AE1	RJF36300CU63AE1
	RKF36160CU63AE1	RKF36200CU63AE1	RKF36250CU63AE1	RKF36300CU63AE1
	RLF36160CU63AE1	RLF36200CU63AE1	RLF36250CU63AE1	RLF36300CU63AE1
6.0P (LSIG)	RGF36160CU64AE1	RGF36200CU64AE1	RGF36250CU64AE1	RGF36300CU64AE1
	RJF36160CU64AE1	RJF36200CU64AE1	RJF36250CU64AE1	RJF36300CU64AE1
	RKF36160CU64AE1	RKF36200CU64AE1	RKF36250CU64AE1	RKF36300CU64AE1
	RLF36160CU64AE1	RLF36200CU64AE1	RLF36250CU64AE1	RLF36300CU64AE1
Micrologic Harmonic Trip Unit with Modbus Communications Interchangeable, 3P, 4P				
5.0H (LSI)	RGF36160CU73AE1	RGF36200CU73AE1	RGF36250CU73AE1	RGF36300CU73AE1
	RJF36160CU73AE1	RJF36200CU73AE1	RJF36250CU73AE1	RJF36300CU73AE1
	RKF36160CU73AE1	RKF36200CU73AE1	RKF36250CU73AE1	RKF36300CU73AE1
	RLF36160CU73AE1	RLF36200CU73AE1	RLF36250CU73AE1	RLF36300CU73AE1
6.0H (LSIG)	RGF36160CU74AE1	RGF36200CU74AE1	RGF36250CU74AE1	RGF36300CU74AE1
	RJF36160CU74AE1	RJF36200CU74AE1	RJF36250CU74AE1	RJF36300CU74AE1
	RKF36160CU74AE1	RKF36200CU74AE1	RKF36250CU74AE1	RKF36300CU74AE1
	RLF36160CU74AE1	RLF36200CU74AE1	RLF36250CU74AE1	RLF36300CU74AE1

¹ For 4P, replace the leading 3 in the catalog number following the prefix with a 4 (RPF36060CU31A becomes RGF46060CU31A).

² Add E1 suffix for Modbus communications.

PowerPact™ M-, P- and R-Frame, and Compact™ NS630b–NS3200 Circuit Breakers

Section 1—General Information

Specifications

Electronic trip molded case circuit breakers have a molded case made of a glass-reinforced insulating material (thermal set composite resin) that provides high dielectric strength. These circuit breakers:

- Are available in either dual-rated Underwriters Laboratory® (UL®) / International Electrotechnical Commission® (IEC®) or IEC-only constructions
- Are also Canadian Standard Association® (CSA®) and Association of the Electrical Sector® (ANCE®) certified (dual-rated UL/IEC circuit breakers only)
- Are manufactured in unit-mount, I-Line™ and drawout (P-frame and NS630b–NS1600) constructions
- Are available with either type ET or Micrologic electronic tripping systems
- Provide optional power monitoring, communications, protective relaying, integral ground-fault protection for equipment and zone-selective interlocking functions
- Share common tripping of all poles
- Can be mounted and operated in any position
- Are equipped with an externally-accessible test port for use with hand-held and full-function test sets
- Are available in motor circuit protector and automatic molded case switch constructions
- Can be reverse connected, without restrictive LINE and LOAD markings
- Meet the requirements of National Electrical Code® (NEC®) Sections 240.6 by providing a means to seal the rating plug and trip unit adjustments

Codes and Standards

M-, P- and R-frame, and NS630b–NS3200 electronic trip circuit breakers and switches are manufactured and tested in accordance with the following standards:

Table 1: Standards

M-Frame, P-Frame and R-Frame Circuit Breakers	P- and R-Frame Switches	NS630b–NS3200 Circuit Breakers	NS630b–NS3200 Switches
UL 489 ¹ IEC Standard 60947-2 CSA C22.2 No 5 Federal Specification W-C-375B/GEN NEMA AB1 NMX J-266 UTE, VDE, BS, CEI, UNE, CCC	UL 489 ² IEC Standard 60947-3 CSA C22.2 No 5 Federal Specification W-C-375B/GEN NEMA AB1 NMX J-266 UTE, VDE, BS, CEI, UNE	IEC Standard 60947-2 Federal Specification W-C-375B/GEN NEMA AB1 UTE, VDE, BS, CEI, UNE	IEC Standard 60947-3 Federal Specification W-C-375B/GEN NEMA AB1 UTE, VDE, BS, CEI, UNE

¹ PowerPact M-frame circuit breaker is in UL File E10027.
PowerPact P-frame circuit breaker is in UL File E63335.
PowerPact R-frame circuit breaker is in UL File E10027.

² PowerPact P-frame switch is in UL File E103740.
PowerPact R-frame switch is in UL File E33117.

Circuit breakers should be applied according to guidelines detailed in the NEC and other local wiring codes.

Circuit Breaker Ratings

Interrupting Rating

The interrupting rating is the highest current at rated voltage the circuit breaker is designed to safely interrupt under standard test conditions. Circuit breakers must be selected with interrupting ratings equal to or greater than the available short-circuit current at the point where the circuit breaker is applied to the system (unless it is a branch device in a series rated combination). Interrupting ratings are shown on the front of the circuit breaker. For grounded B phase interrupting ratings, see Data Bulletin 2700DB0202.

Table 2: UL/IEC Circuit Breaker Interrupting Ratings

Circuit Breaker ¹	UL/CSA Rating (60 Hz)				IEC 60947-2 Rating (50/60 Hz)			
	3 Phase			Grounded B Phase (1Ø-3Ø)	240 Vac		380/415 Vac	
	240 Vac	480 Vac	600 Vac	240 Vac 2P	Icu	Ics	Icu	Ics
MG	65 kA	35 kA	18 kA	65 kA	50 kA	25 kA	35 kA	20 kA
MJ	100 kA	65 kA	25 kA	65 kA	65 kA	35 kA	50 kA	25 kA
PG	65 kA	35 kA	18 kA	65 kA	50 kA	25 kA	35 kA	20 kA
PJ	100 kA	65 kA	25 kA	65 kA	65 kA	35 kA	50 kA	25 kA
PK	65 kA	50 kA	50 kA	65 kA	50 kA	25 kA	50 kA	25 kA
PL	125 kA	100 kA	25 kA	65 kA	125 kA	65 kA	85 kA	45 kA
RG	65 kA	35 kA	18 kA	35 kA	50 kA	25 kA	35 kA	20 kA
RJ	100 kA	65 kA	25 kA	100 kA	65 kA	35 kA	50 kA	25 kA
RK	65 kA	65 kA	65 kA	65 kA	85 kA	65 kA	70 kA	55 kA
RL	125 kA	100 kA	50 kA	125 kA	125 kA	65 kA	85 kA	45 kA

¹ The K interrupting rating is recommended for applications having high inrush and/or non-linear loads such as large motors, transformers, motors with soft starts, etc.

Table 3: IEC Only Circuit Breaker Interrupting Ratings (50/60 Hz)

Circuit Breaker	Interrupting Rating	220/240 Vac		380/415 Vac		440 Vac		500/525 Vac		660/690 Vac	
		Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics
Electrically Operated											
NS630b–NS1600	N Interrupting Rating	50 kA	37 kA	50 kA	37 kA	50 kA	37 kA	40 kA	30 kA	30 kA	22 kA
NS630b–NS1600	H Interrupting Rating	70 kA	35 kA	70 kA	35 kA	65 kA	32 kA	50 kA	25 kA	42 kA	21 kA
NS630b–NS1000	L Interrupting Rating	150 kA	150 kA	150 kA	150 kA	130 kA	130 kA	100 kA	100 kA	—	—
Manually Operated											
NS630b–NS1600	N Interrupting Rating	85 kA	50 kA	50 kA	50 kA	50 kA	50 kA	40 kA	40 kA	30 kA	30 kA
NS630b–NS1600	H Interrupting Rating	85 kA	52 kA	70 kA	52 kA	65 kA	48 kA	50 kA	37 kA	42 kA	31 kA
NS630b–NS1000	L Interrupting Rating	150 kA	150 kA	150 kA	150 kA	130 kA	130 kA	100 kA	100 kA	—	—
NS630b–NS800	R Interrupting Rating	200 kA	200 kA	200 kA	200 kA	200 kA	200 kA	100 kA	100 kA	75 kA	75 kA
NS1600b–NS3200	N Interrupting Rating	85 kA	65 kA	70 kA	52 kA	65 kA	65 kA	65 kA	65 kA	65 kA	65 kA
NS1600b–NS3200	H Interrupting Rating	125 kA	94 kA	85 kA	64 kA	85 kA	64 kA	—	—	—	—

PowerPact™ M-, P- and R-Frame, and Compact™ NS630b–NS3200 Circuit Breakers

Section 2—Electronic Trip Systems

exceeded, will trip the circuit breaker with no intentional delay. Instantaneous trip dial settings are 2–16 x I_n for 600 A circuit breakers and 1.5–12 x I_n for 800–1200 A circuit breakers.

Micrologic™ Electronic Trip Systems

The P-frame, R-frame and NS630b–NS3200 electronic trip circuit breakers can be equipped with the optional Micrologic trip systems listed below:

Table 15: Micrologic Trip Systems

Model	(LS0) Long-time + Short-time + Zero delay (IEC Rated Only)	(LI) Long-time + Instantaneous Protection (UL Listed, IEC Rated)	(LSI) Long-time + Short-time + Instantaneous Protection (UL Listed, IEC Rated)	(LSIG) Long-time + Short-time + Instantaneous Protection + Equipment Ground-fault Protection (UL Listed, IEC Rated)
Micrologic Basic Trip Unit	2.0	3.0	5.0	—
Micrologic A Trip Unit	2.0A	3.0A	5.0A	6.0A
Micrologic P Trip Unit	—	—	5.0P	6.0P
Micrologic H Trip Unit	—	—	5.0H	6.0H

Trip units are designed to protect power circuits and loads. Micrologic trip systems use a set of current transformers (called CTs or sensors) to sense current, a trip unit to evaluate the current, and a tripping solenoid to trip the circuit breaker. Adjustable rotary switches on the trip unit allow the user to set the proper overcurrent or equipment ground-fault current protection required in the electrical system. If current exceeds a set value for longer than its set time delay, the trip system opens the circuit breaker. Alarms may be programmed for remote indications. Measurements of current, voltage, frequency, power, and power quality optimize continuity of service and energy management.

Integration of protection functions in the Application Specific Integrated Circuit (ASIC) electronic component used in all Micrologic trip units guarantees a high degree of reliability and immunity to conducted or radiated disturbances. On Micrologic P and H trip units, advanced functions are managed by an independent microprocessor.

Circuit breakers are shipped with the trip unit long-time pickup switch set at 1.0 and all other trip unit adjustments set at their lowest settings. Actual settings required for a specific application must be determined by a qualified consultant or plant engineer. A coordination study is recommended to provide coordination between all circuit breakers in the distribution system.

Table 16: Micrologic™ Trip Unit Features

Feature	Micrologic Trip Unit (X = Standard Feature O = Available Option)										
	Standard			Ammeter				Power		Harmonics	
	2.0	3.0	5.0	2.0A	3.0A	5.0A	6.0A	5.0P	6.0P	5.0H	6.0H
Field-Installable	X	X	X	X	X	X	X	X	X	X	X
LI		X			X						
LS0	X			X							
LSI			X			X		X		X	
LSIG/Ground-Fault Trip ¹							X		X		X
Ground-Fault Alarm/No Trip ^{1, 2}								X		X	
Ground-Fault Alarm and Trip ^{1, 2}									X		X
Adjustable Rating Plugs	X	X	X	X	X	X	X	X	X	X	X
True RMS Sensing	X	X	X	X	X	X	X	X	X	X	X
UL Listed		X	X		X	X	X	X	X	X	X
Thermal Imaging	X	X	X	X	X	X	X	X	X	X	X
Phase-Loading Bar Graph				X	X	X	X	X	X	X	X

PowerPact™ M-, P- and R-Frame, and Compact™ NS630b–NS3200 Circuit Breakers

Section 2—Electronic Trip Systems

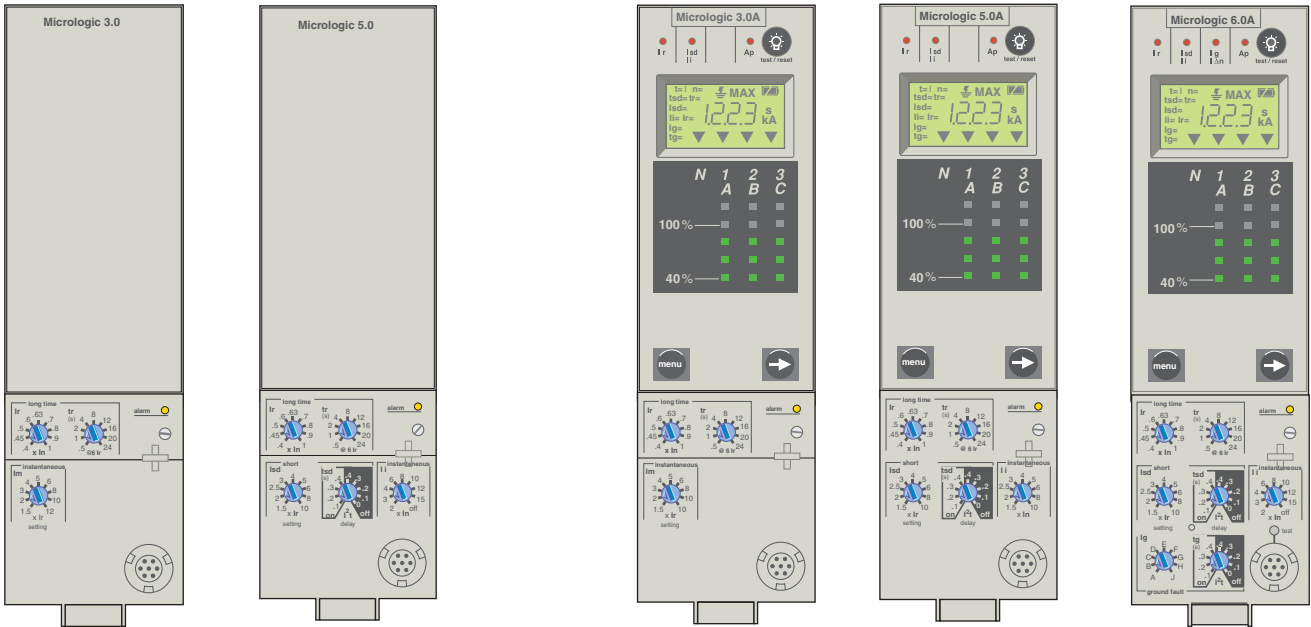
Table 16: Micrologic™ Trip Unit Features (continued)

Feature	Micrologic Trip Unit (X = Standard Feature O = Available Option)										
	Standard			Ammeter				Power		Harmonics	
	2.0	3.0	5.0	2.0A	3.0A	5.0A	6.0A	5.0P	6.0P	5.0H	6.0H
LED for Long-Time Pick-Up	X	X	X	X	X	X	X	X	X	X	X
LED for Trip Indication				X	X	X	X	X	X	X	X
Digital Ammeter				X	X	X	X	X	X	X	X
Zone-Selective Interlocking ³				X		X	X	X	X	X	X
Communications				O	O	O	O	X	X	X	X
LCD Dot Matrix Display								X	X	X	X
Advanced User Interface								X	X	X	X
Protective Relay Functions								X	X	X	X
Neutral Protection ¹								X	X	X	X
Contact Wear Indication								X	X	X	X
Incremental Fine Tuning of Settings								X	X	X	X
Selectable Long-Time Delay Bands								X	X	X	X
Power Measurement								X	X	X	X
Power Quality Measurements										X	X
Waveform Capture										X	X

¹ 3Ø, 4W circuits require either a neutral current transformer or a 4-pole breaker.

² Requires M6C Programmable Contact Module.

³ Not available for 2.0A trip units as upstream devices.

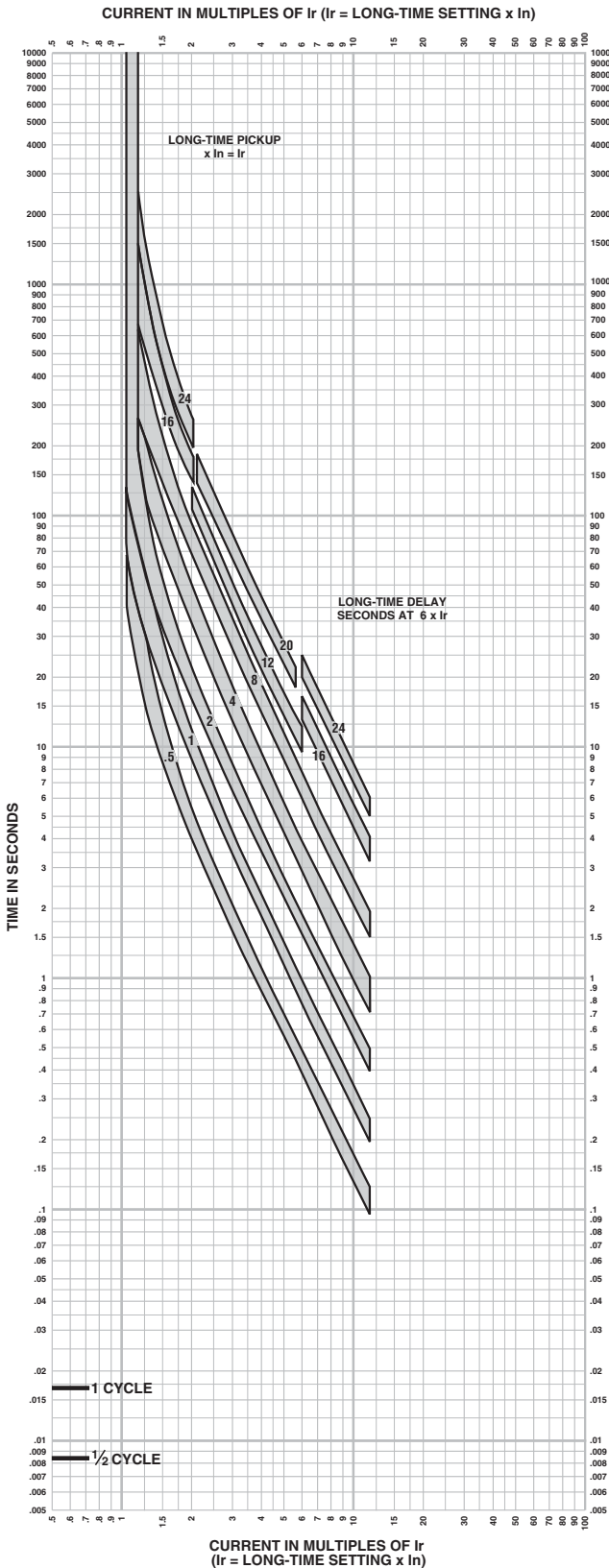


Micrologic 3.0 and 5.0 Basic Trip Units

Micrologic 3.0A, 5.0A and 6.0A Trip Units

PowerPact™ M-, P- and R-Frame, and Compact™ NS630b–NS3200 Circuit Breakers
Section 11—Trip Curves

Micrologic 3.0A P-Frame and R-Frame Trip Unit Characteristic Trip Curve



Micrologic 3.0A Trip Unit

Long-Time Pickup and Delay

Characteristic Trip Curve No. 613-6

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to $+60^{\circ}\text{C}$ (-22°F to $+140^{\circ}\text{F}$) ambient temperature.

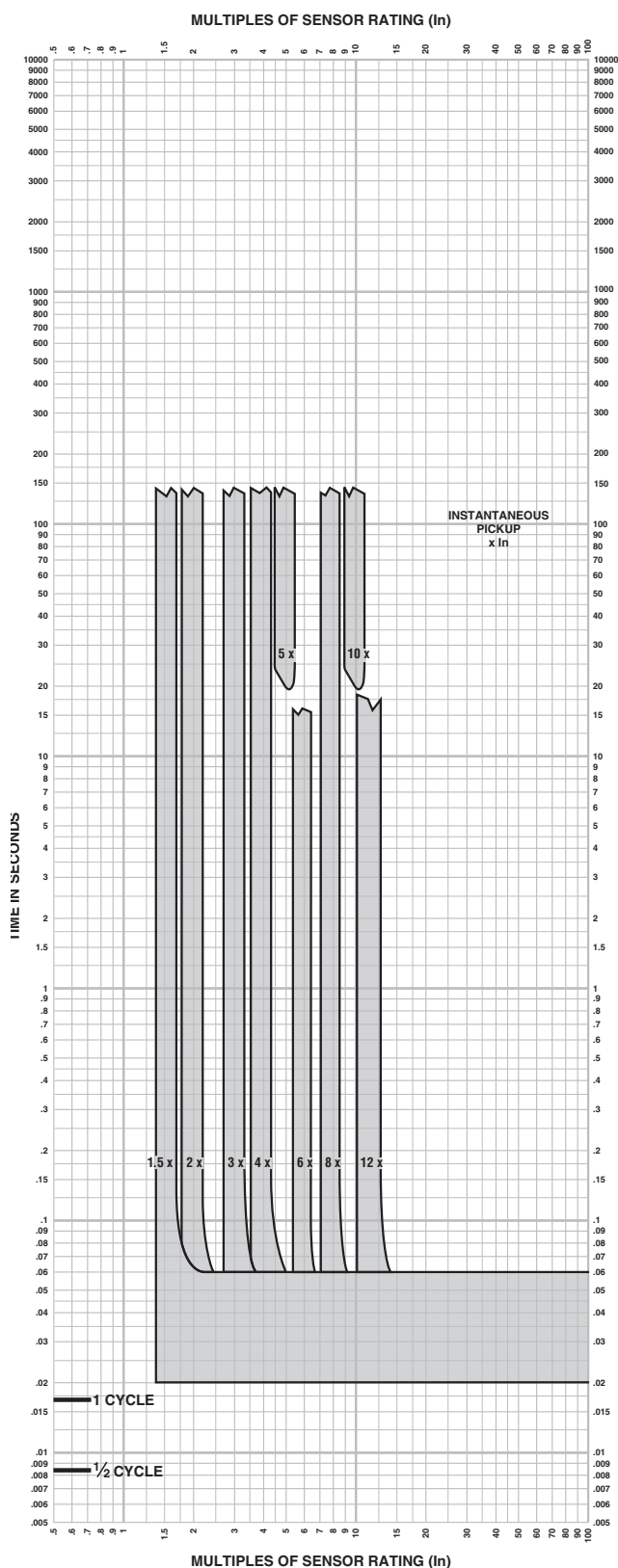
Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately twenty minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the instantaneous setting of the circuit breaker.
3. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of current.
4. See trip curve 613-8 on page 139 for instantaneous pickup trip curve.

PowerPact™ M-, P- and R-Frame, and Compact™ NS630b–NS3200 Circuit Breakers

Section 11—Trip Curves

Micrologic 3.0A P-Frame and R-Frame Trip Unit Characteristic Trip Curve



Micrologic 3.0A Trip Unit

Instantaneous Pickup, 1.5X to 12X Characteristic Trip Curve No. 613-8

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to +60°C (-22°F to +140°F) ambient temperature.

Notes:

1. The end of the curve is determined by the interrupting rating of the circuit breaker.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of current.
3. The instantaneous region of the trip curve shows maximum total clearing times. Actual clearing times in this region can vary depending on the circuit breaker mechanism design and other factors. The actual clearing time can be considerably faster than indicated. Contact your local sales office for additional information.
4. See trip curve 613-6 on page 138 for long-time pickup and delay trip curves.

Curve No. 0613TC0008
Drawing No. B48095-613-08



ENGINE & COMPRESSOR ACCESSORIES
SECONDARY CONTAINMENT (DOUBLE WALL) GENERATOR BASE
TANKS AND SOUND ATTENUATED ENCLOSURES

42146 Highway 290 Business Waller, TX. 77484
Phone: 713/466-8679 Fax: 713/466-8686 Toll Free: 800/729-8807
<http://www.daytank.com>

PAGE: 1 OF 4

PHONE #

RE: Cummins 1500 DQGAB; Insulated Aluminum Enclosure
60 Hour UL 142 Base Tank

DATE: February 2, 2019

1- Insulated Enclosure:

The enclosure base dimensions are 120" wide x 280" long x 148" tall. The inside dimensions are 112" wide x 272" long x 144" tall. The fixed weather louvers will extend an additional 7" on both ends of the enclosure. The enclosure lifting eyes extend an additional 4" above the roof line.

The General Construction of the enclosure will be as follows:

Outer Skin	.09" Thick 5052 - H32 Aluminum
Roof Skin	.09" Thick 5052 - H32 Aluminum
Interior Stiffeners	.09" Thick 5052 - H32 Aluminum
Acoustical Pack	4# Per Cubic Foot Mineral Wool
Protective Liner	2 Mil Mylar
Interior Perforated Liner	22 Ga. Perforated Aluminum
Base Frame	C6 Channel 6061-T6 Aluminum
Enclosure	4X4 Square Tubing 6061-T6 Aluminum

Accessories:

The enclosure will be provided with the following accessories:

Inlet & discharge weather louvers with birdscreen (aluminum construction)

Two (2) double access service doors 72" W x 78" H

Two (2) single access service doors 48" W x 78" H

Door hardware to include:

- Handles and Hinges - Refrigerator style stainless steel
- neoprene gasket single sealed around the door perimeters
- bolting hardware stainless steel

Gasket to place between the enclosure and the base tank

One (1) engine exhaust opening with stainless steel weather cap

Two (2) roof mounted muffler support channels for interior mounting

Rain lips over all doors

Four (4) lifting eyes marked " For Enclosure Removal Only"

Two (2) Fall protection d-rings on roof

Painting:

All exterior surfaces will receive two coats American Coatings polyurethane.

Color to be Onan Green.

Inside surfaces will not be painted.

Approx Weight 7,000 Lbs.

Included Electrical Package:

The enclosure will be provided with:

Four (4) Fluorescent light fixtures

Two (2) Three way Switches

Two (2) 20 amp GFI duplex receptacles

One (1) 100 amp MB, 120/240 AC, single phase, 60 Hz control panel housed in a NEMA-3r box with breakers.

All conduit will be EMT with water tight connections

7180 Gallon UL-142 Base Tank:

1 - E&CA Model SCGBT7180, 7180 gallon capacity SECONDARY CONTAINMENT (DOUBLE WALL) GENERATOR BASE TANK with the following standard features:

Heavy gauge steel construction	2" x 1" NPT removable fuel supply dip tube
Primary Tank	1" NPT fuel return
1/4" thick steel top	1" NPT overflow (optional)
1/4" thick steel bottom, sides, ends, and baffles	1" NPT exterior drain
Outer Tank	No fixed heights (recommended maximum 36")
1/4" thick steel channel sides	Each tank designed to your specifications
1/4" thick steel bottom, and ends	Tank baffles to increase structural strength and to cool fuel
2" NPT fill connection	Inner tank pressure tested to 3 psi
1½" NPT level gage	Outer tank pressure tested to 3 psi
2" NPT normal vent inner tank	Four sided complete base enclosure
Emergency vent 8" NPT inner tank	
Emergency vent 8" NPT outer tank	Exterior - E&CA gray or gloss black polyurethane

SCGBT7180 (120" wide x 370" long x 48" tall plus beams)

and including the following optional features:

OPT-ULD - This Tank Built To UL-142

OPT-UL - This Tank Requires The UL Label

OPT-229F - Secondary Containment Vent/Fill/Alarm Package Including One 2" NPT Locking Fill Cap, One Low Level Float Switch, One Leak Detector Float Switch, One 2" NPT Normal Vent Cap Cap, And Two 8" NPT Emergency Vent Caps

OPT-651 - 5 Gallon Fill / Spill Containment Device, Internal Drain, 2" Camlock Tight-Fill Connection

OPT-544B - High Fuel Level Float Switch With Conduit Box, Contacts Rated 20 VA, 0.16 Amps
Set at 90%

OPT-330C - High Level Alarm Panel, 9 VDC Internal Battery, With Light Alarm and Silence Switch
Set at 95%

OPT-653B - Overfill Prevention Valve, 4" Connection with 2" fuel connection

OPT-682 - Supportive Cross Members, 6" W6-25

OPT-610A - Top Mounted Vibration Isolator Mounting Pad

OPT-510 - Internal Stub Up Area

OPT-620B - Lifting Eyes, Heavy Duty

OPT-400M - Gloss Black

OPT-230D - Extra Connection Welded To Tank, 2" NPT

Weight 22,000 Pounds

Galvanized platforms, stairs & handrails (both sides)

Included Packaging:

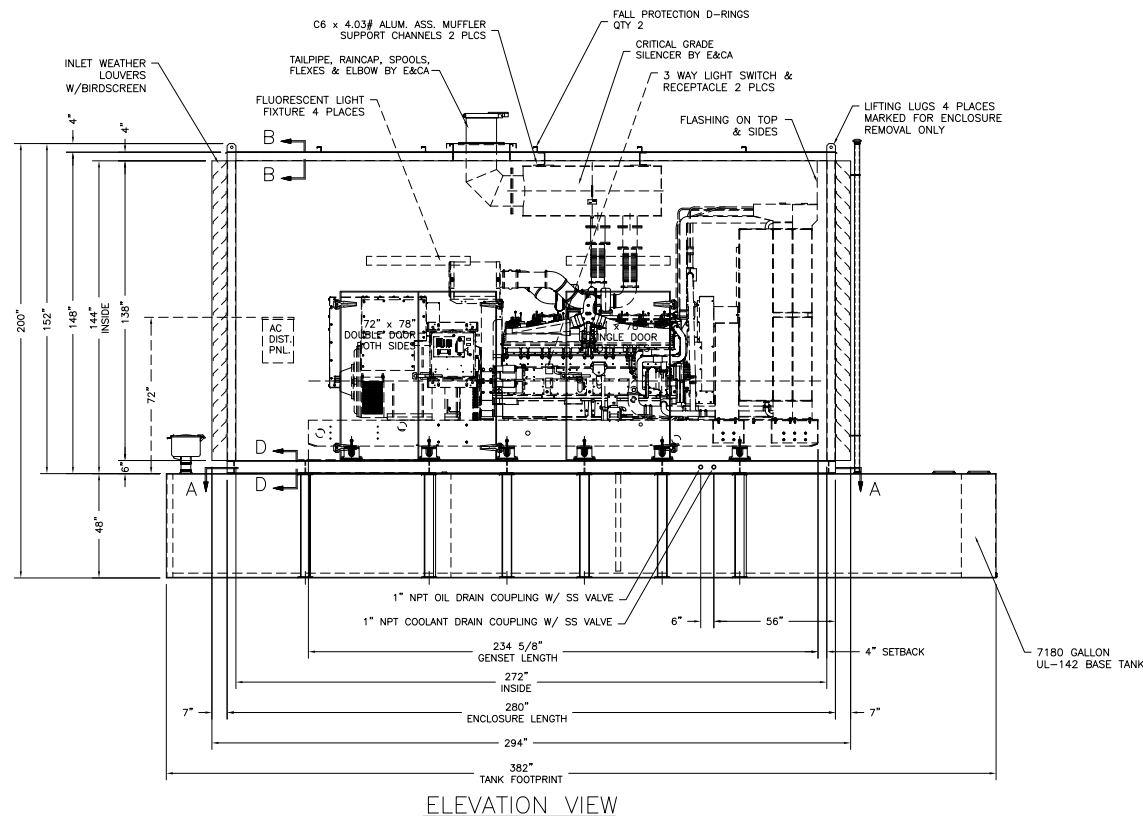
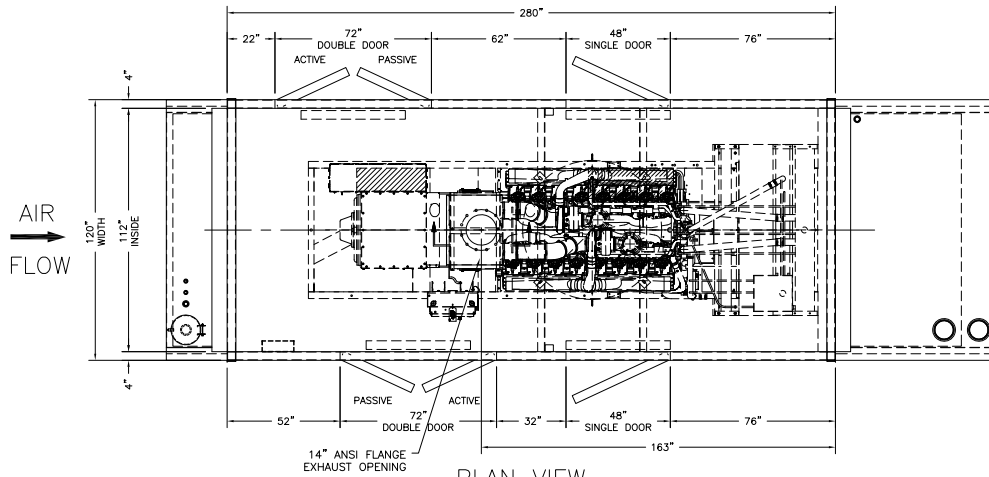
The following items will be furnished by Customer, shipped to E&CA facility and packaged:

Generator set skidded unit - Received and mounted on top of base tank
Spring isolators - mounted between base skid and gen set
Jacket water heaters - wired to ac electrical panel board (if purchased)
Fuel supply and return flex lines - connected to base tank
Battery charger and batteries - wired to the engine starter

The following items will be furnished by E&CA.

Insulated enclosure
7180 gallon UL-142 base tank
Engine exhaust muffler (Critical Grade, carbon steel construction) and flex - mounted inside
Exhaust transition from flex to muffler, enclosure roof rain guard, rain cap, tailpipe, outlet elbow, bolting hardware & gaskets
Oil and coolant drains plumbed to enclosure skid with SS ball valves
Flashing between radiator and walls
Block gen-set for shipment
Load on customer's truck

E & C A "CUSTOM FIT"



NOTES: ENCLOSURE ASSEMBLY:

- FOR A CUMMINS 1500 DQGAB GEN-SET.
- FULLY ASSEMBLED DROP OVER ENCLOSURE TO BE ANCHORED TO THE BASE TANK.
- PANEL JOINTS ARE SKIP WELDED AND CAULKED.

ENCLOSURE CONSTRUCTION:

- WALLS AND ROOF - .09" 5052-H32 ALUMINUM.
- FRAME CONSTRUCTION - 6061-T6 ALUMINUM STRUCTURAL CHANNEL & 6061-T6 ALUMINUM TUBING.
- INNER LINER - PERFORATED ALUMINUM.
- INSULATION - MINERAL WOOL AND POLY LINER.
- DOORS - TWO (2) SINGLE & TWO (2) DOUBLE ACCESS SERVICE DOORS STAINLESS STEEL HINGES AND DOOR LATCHES.
- LOUVERS - INLET & DISCHARGE WEATHER LOUVERS W/STAINLESS STEEL BIRDSCREEN. ALUMINUM CONSTRUCTION.
- BOLTING HARDWARE - STAINLESS STEEL.

DESIGN SPECIFICATIONS:

- BASED ON A TOTAL AIR REQUIREMENT OF 65,045 CFM AT LESS THAN 1/2" W.G. BACK PRESSURE THROUGH THE ENCLOSURE.
- ENGINE EXHAUST IS NOT INCLUDED
- GEN-SET TO BE ISOLATED FROM SKID.

PAINTING:

- ALL EXTERIOR ALUMINUM SURFACES TO BE SOLVENT CLEANED PER SSPC-SP1 AND PAINTED AS FOLLOWS:
PRIMER - ONE COAT PRIMER (0.5-1 MILS DFT)
INTERMEDIATE - ONE COAT AMERICAN COATINGS POLYURETHANE (1-2 MILS DFT)
FINISH - ONE COAT AMERICAN COATINGS POLYURETHANE (1.5-2 MILS DFT)
• COLOR - ENCLOSURE - ONAN GREEN.
TANK - GLOSS BLACK

ELECTRICAL:

- SEE DRAWING H1025183C

ENCLOSURE SHIPPING SIZE & WEIGHT:

- SIZE - 294" L x 126" W x 152" H
- WEIGHT - 7,000 LBS.

TOTAL ENCLOSURE/TANK SHIPPING SIZE & WEIGHT:

- SIZE - 382" L x 129" W x 201" H
- WEIGHT - 58,500 LBS.

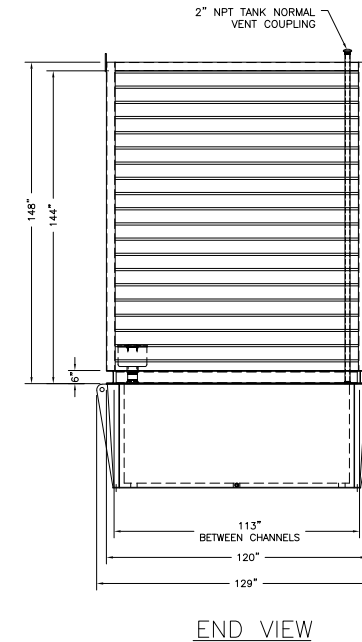
☒ **APPROVED AS IS** - Manufacturing may proceed.

☐ **APPROVED WITH NOTED CHANGES** - Resubmit drawing; manufacturing may proceed.

☐ **NOT APPROVED** - Correct drawing as noted and resubmit for approval before manufacturing begins.

BY **Santosh Dulam** DATE **02/13/19**

Cummins Southern Plains, LLC

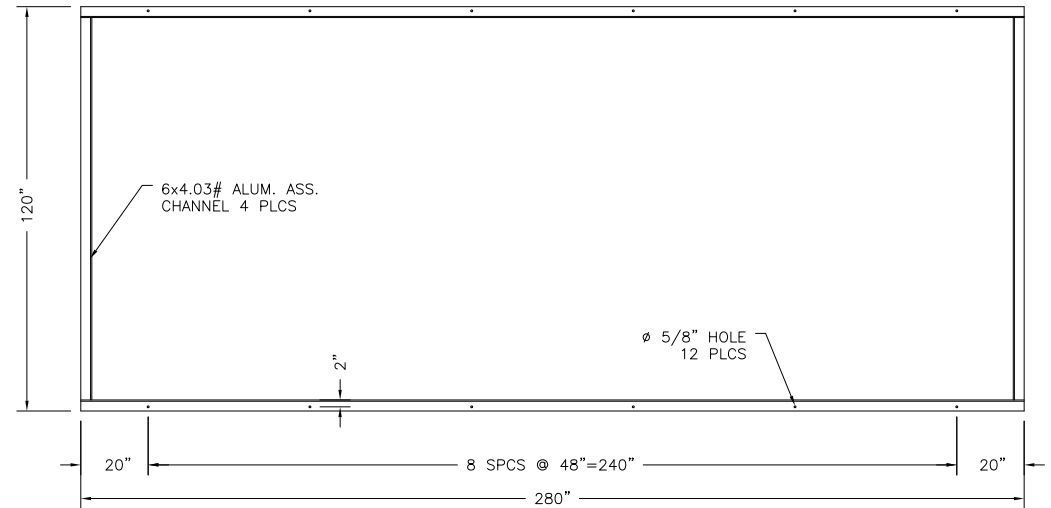
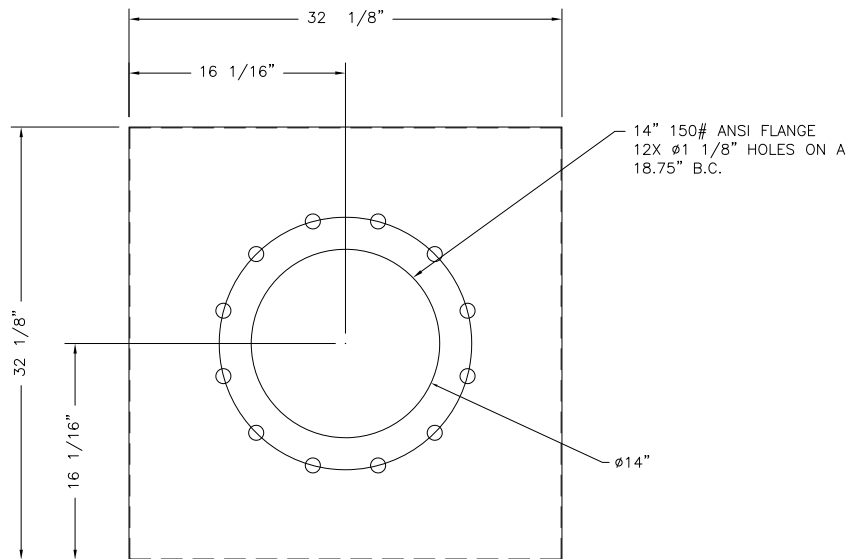


ACOUSTICAL ENCLOSURE

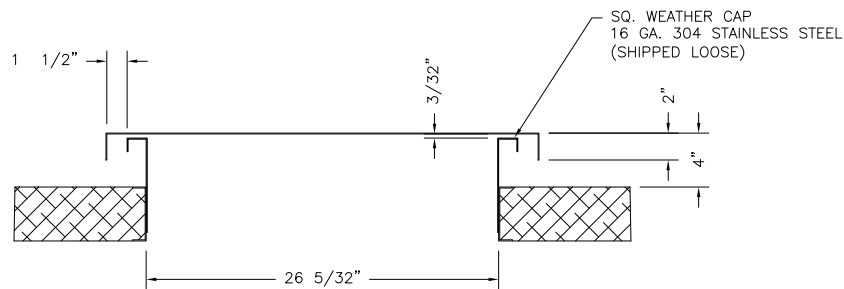
CUMMINS 1500 DQGAB

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DATE 2/1/19			REVISION 0		

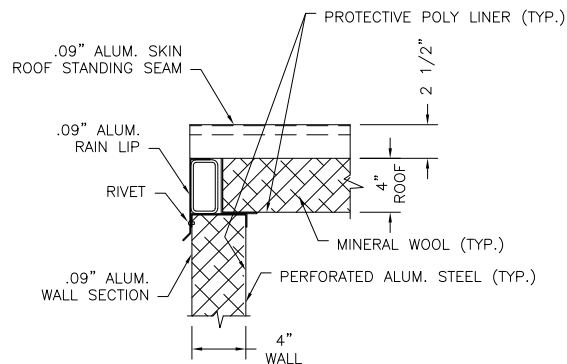
E & C A "CUSTOM FIT"



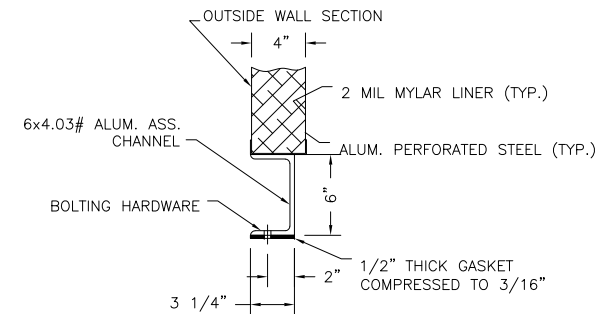
SECTION B-B



SECTION A-A



SECTION C-C



SECTION D-D

ACOUSTICAL ENCLOSURE

CUMMINS 1500 DQGAB

PROJECT NAME
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DRAWING NUMBER
H10254183B

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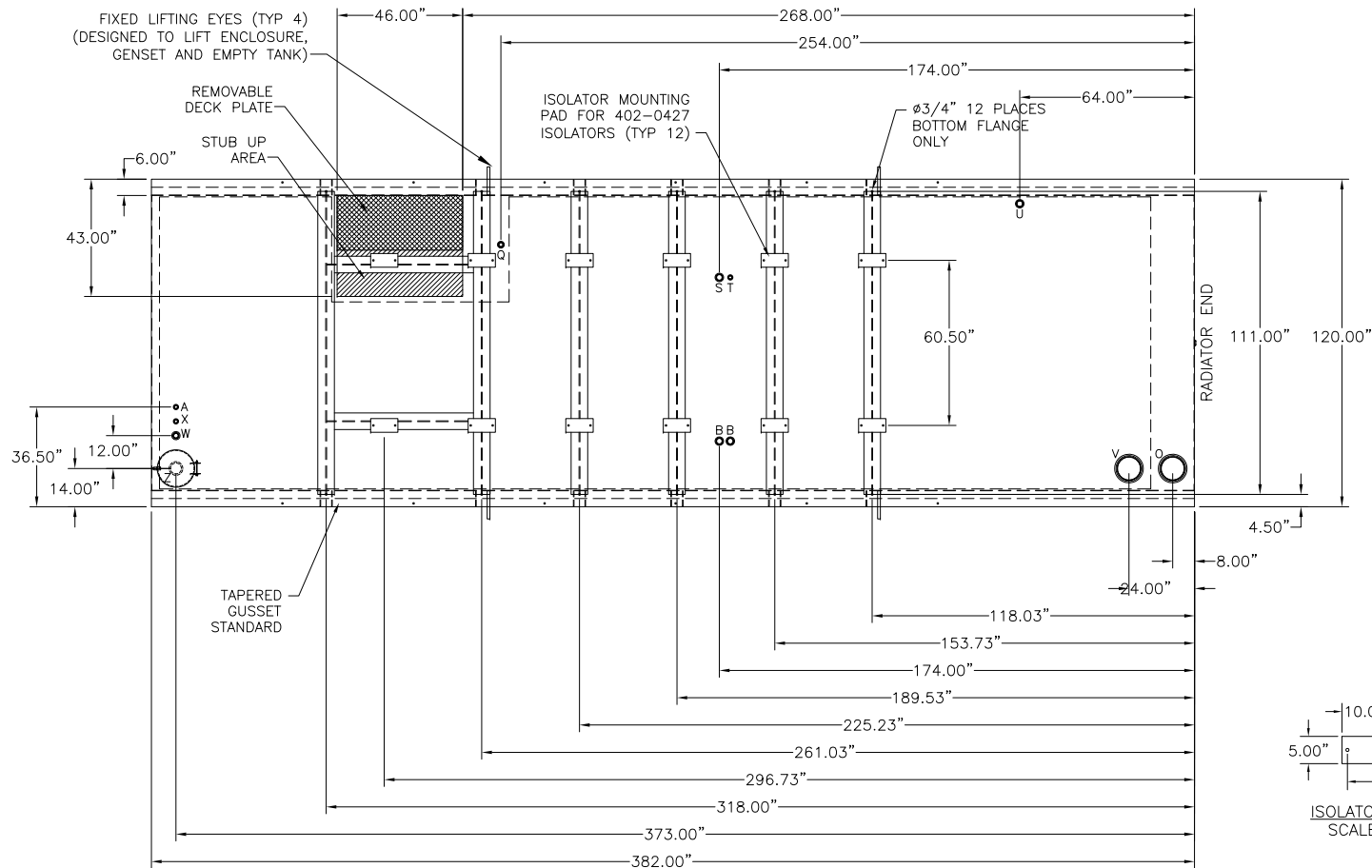
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DATE
2/1/19

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JS

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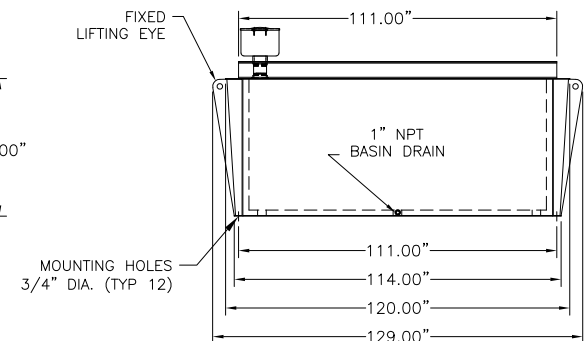
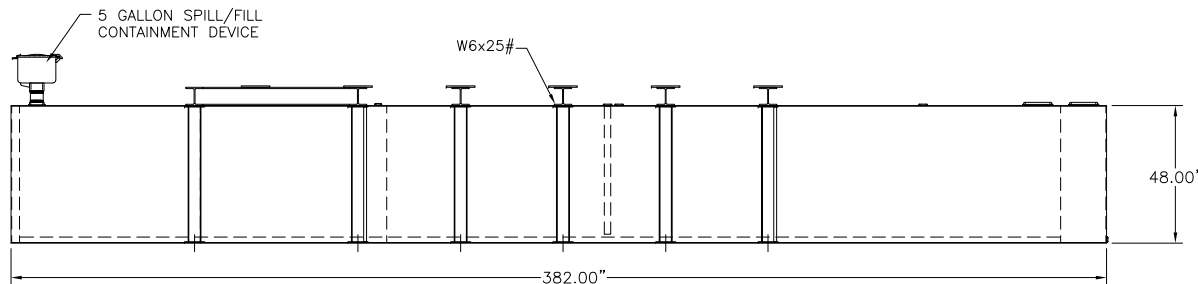
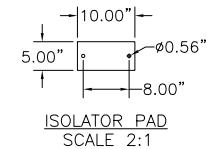
REFERENCES	DESCRIPTION
O 8" NPT	OUTER TANK EMERGENCY VENT CONNECTION
Q 1 1/4"	OPTIONAL LEAK DETECTOR LOCATION
S 2"x3/4" NPT	REMOVABLE FUEL SUPPLY DIP TUBE
T 1" NPT	FUEL RETURN
U 2" NPT	NORMAL VENT CONNECTION
V 8" NPT	INNER TANK EMERGENCY VENT CONNECTION
W 1 1/2"	LEVEL GAUGE
X 1" NPT	LOW LEVEL ALARM SET AT 50%
Z 2" NPT	FILL CONN. WITH SOLENOID VLV. SET AT 95%
A 1" NPT	HIGH LEVEL FLOAT SWITCH SET AT 90% W/ ALARM
B 2" NPT	SPARE (QTY. 2)

OPTIONS:

- ☒ 530B LEAK DETECTOR FLOAT SWITCH
- ☒ 540B LOW LEVEL FLOAT SWITCH
- ☒ DESIGNED PER UL-142
- ☒ LABEL PER UL-142
- ☒ INNER TANK EMERGENCY VENT
- ☒ OUTER TANK EMERGENCY VENT

PAINT: GLOSS BLACK

GEN SET MODEL NO. CUMMINS 1500 DQGAB
 GEN SET WEIGHT 28,000 LBS.
 TANK CAPACITY 7180 GALLONS
 TANK WEIGHT 22,000 LBS.
 MODEL NUMBER SCGBT7180
 PROPOSAL NUMBER H102518-3
 CUSTOMER NAME CSP-HOU
 PO #

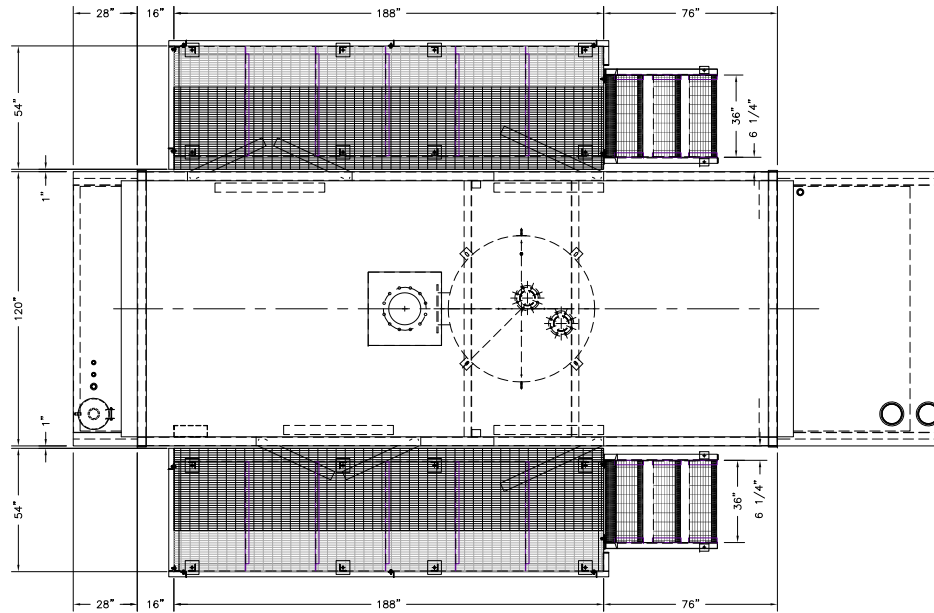


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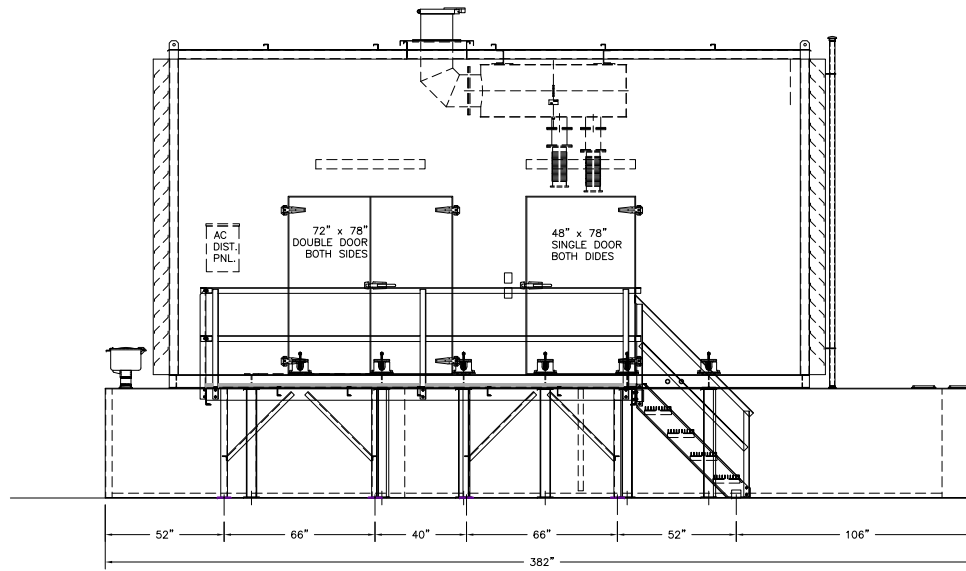
SECONDARY CONTAINMENT (DOUBLE WALL) GENERATOR BASE TANK

DRAWING NUMBER H1025183D	SCALE NONE DATE 2/1/19	APPROVED BY	DRAWN BY JS REVISION 0	PROJECT DESCRIPTION CUMMINS 1500 DQGAB	SHEET 4 OF 4	PROJECT NAME SJRA WP2
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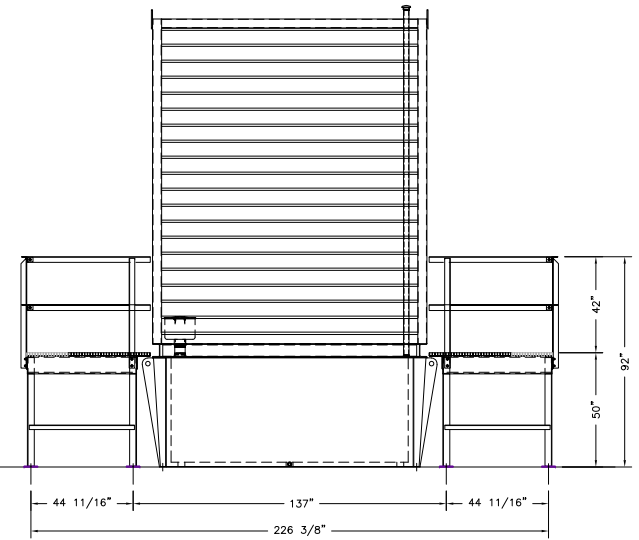
E & C A "CUSTOM FIT"



PLAN VIEW



ELEVATION VIEW



END VIEW

PLATFORMS

CUMMINS 1500 DQGAB

DRAWING NUMBER
H1025183E

SCALE NONE
DATE 2/2/19

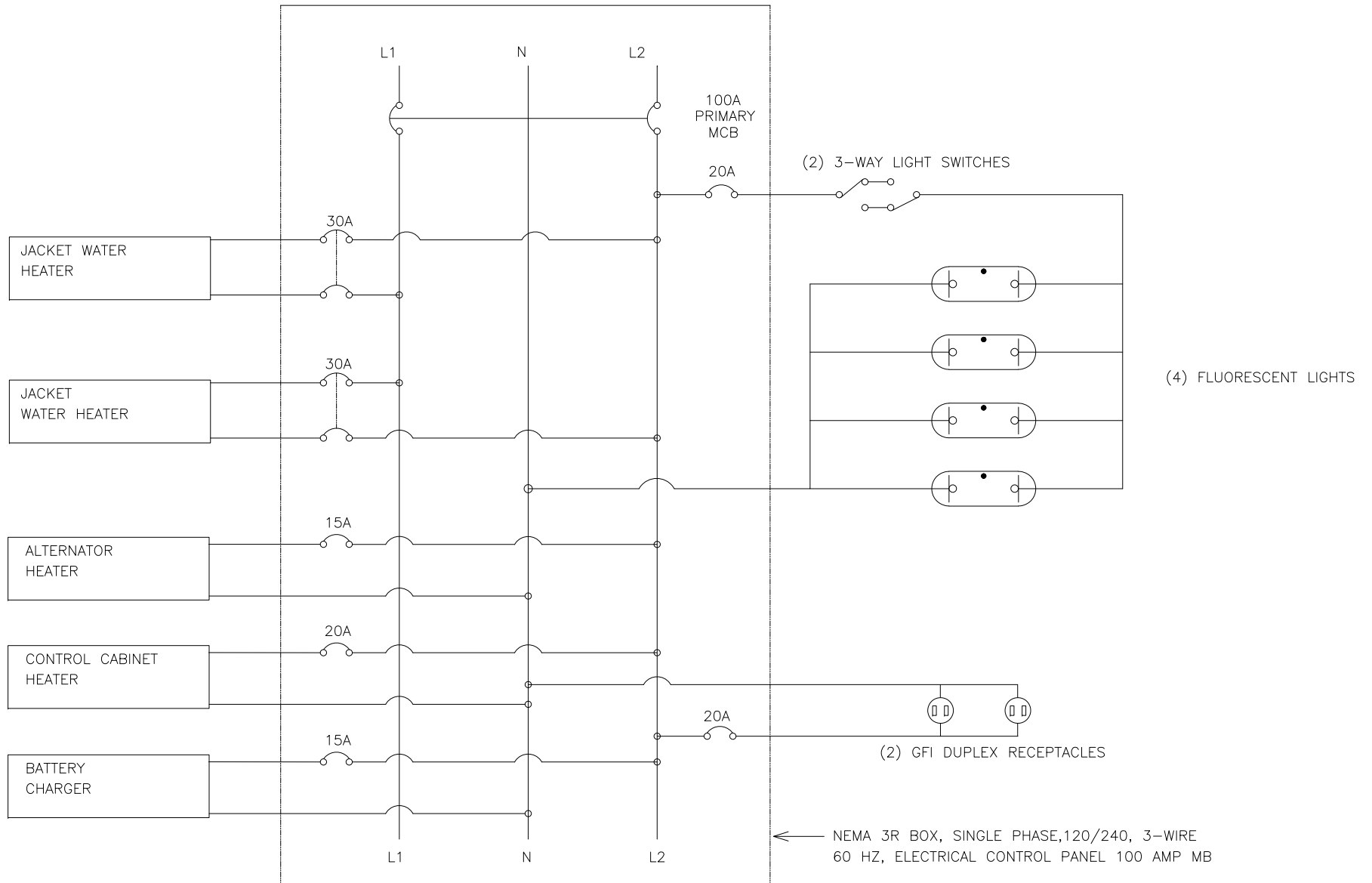
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REVISION 0

SHEET

PROJECT NAME
SJRA WP2

E & C A "CUSTOM FIT"



WIRING DIAGRAM

CUMMINS 1500 DQGAB

PROJECT NAME
SJRA WP2

DRAWING NUMBER
H1025183C

SCALE
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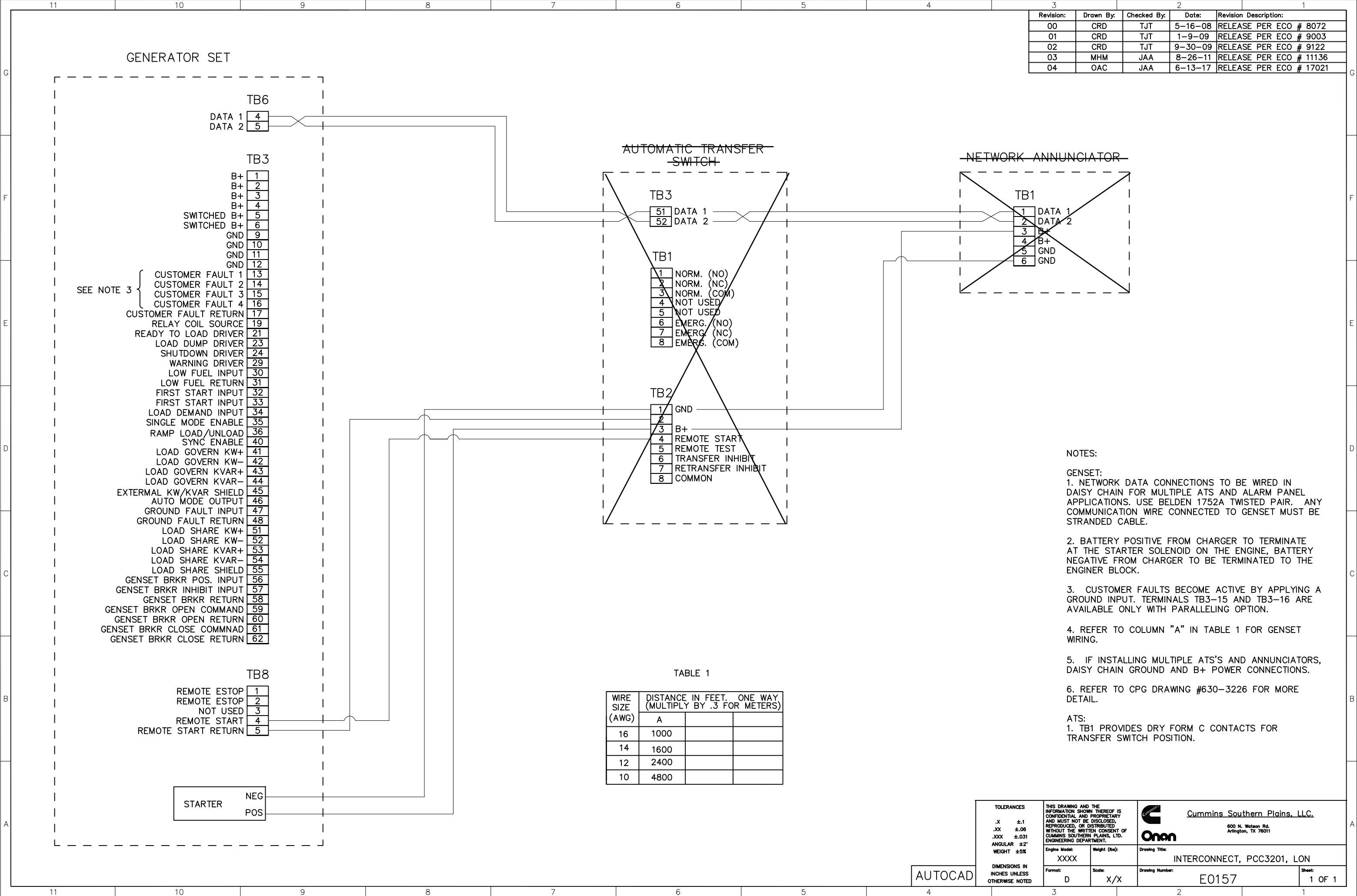
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REVISION
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DATE
2/13/19

Installation Accessory Section



Ground fault indication relay - H550, H666, H667, H668



> Specification sheet

Our energy working for you.™



Code requirements

NFPA 70, the U.S. National Electrical Code (NEC) requires that services of 1000 amps and larger in capacity which operate at more than 150 volts from line-to-neutral must be provided with ground fault equipment. Generator sets rated at 1000 amps and larger which serve as emergency power must be provided with ground fault indication equipment. Health care facilities that utilize ground fault protection equipment must be provided with a coordinated multi-level ground fault system.

Cummins Power Generation ground fault indication equipment is designed for use in emergency/standby power systems, for indication of ground fault conditions during generator set operation.

Features

Suitable for indicating a ground fault condition on a generator set which is either locally or remotely grounded.

Supply voltage - Operates on 24 VDC (nominal)
control power - fully functional at voltages from 18-30 VDC.

Direct connection - Suitable for direct connection to generator sets operating at voltages up to 600 VAC (line to line).

Ground fault current settings - 100-1200 A, in 10 discrete settings: 100, 150, 200, 250, 300, 450, 600, 750, 800, 1200 A.

Monitoring - Provides continuous monitoring of neutral-to-ground with LED indication for open connection.

Factory mounted controls - Available factory-mounted and interconnected to Cummins Power Generation Detector™ series PowerCommand® controls.

Link reconnection - For use with either 3-pole (solid neutral) or 4-pole (switched neutral) transfer switches.

Indicating lamps - For Relay on (green), ground fault current over setting (red), loss of ground connection (red).

Time delay settings – Adjustable 0-10 seconds.

Circuit board - One-piece molded case fully potted.

Contacts - One set of form C output, 8A at 250 VAC, 8A at 30 VDC.

"Test" - Push-button.

"Reset" - Push-button.

Percent full scale metering output - 0-1 mA full scale.

Bonding jumper - Sized per NEC requirements.

Construction

The relay is provided in a non-conducting phenolic case, with provisions for panel mounting or mounting to a standard DIN rail (panel mounting is recommended for mounting on a generator set). Relay components are fully potted with epoxy resin for vibration resistance and durability.

The relay includes an integral terminal block assembly, which accepts wires up to 12-gauge.

Relay function selection link (auto/hand reset).

Environmental range - Operating -10 °C to +60 °C, storage -20 °C to 70 °C.

DC supply burden – 2.5 W.

Transfer switch type selection link - (3-pole or 4-pole).

System operation

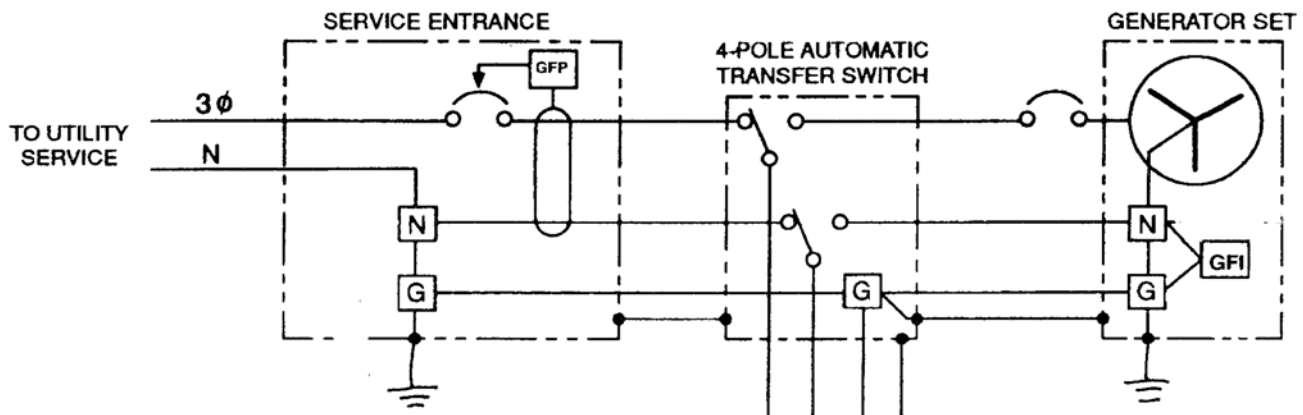
The ground fault relay continuously monitors the voltage across the neutral-to-ground bonding jumper and lights the ground fault alarm lamp on the generator set control when the connection is broken.

When the generator set is running, the relay continuously monitors the neutral-to-ground generator set connection and lights the ground fault alarm lamp on the generator set control when a ground fault condition is sensed.

Alarm condition can be cleared by pushing the reset switch on the generator set control panel. Actual ground fault current level can be monitored with a 0-1 mA meter, directly from the relay. A push button test switch is provided to simulate ground fault conditions and operate the relay and indication circuitry. Addition of the auto-reset link activates automatic reset of the relay after the ground fault condition has cleared.

System schematic

Separately derived system connections (local grounding connection).



Neutral-to-ground bonding jumper must be sized per code requirements. For non-separately derived systems (3-phase/4-wire systems with 3-pole transfer switch), the ground connection and the neutral-to-ground bonding jumper on the generator set are removed, and the 3-pole ATS link is added to the ground fault relay. For non-separately derived systems a label must be applied to the service entrance switchboard, indicating that removal of the equipment-bonding jumper can cause hazardous operating conditions.

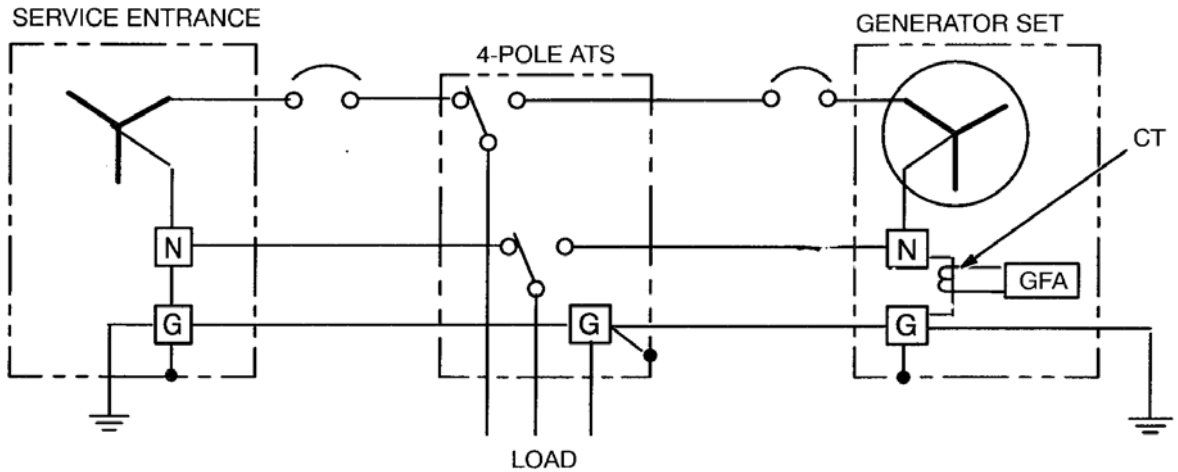
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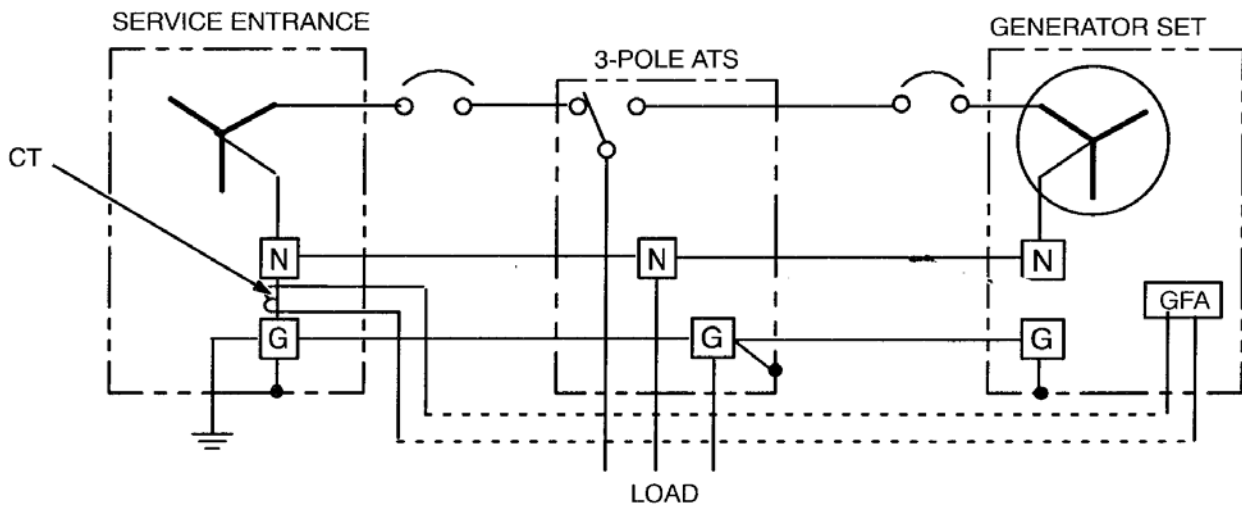


0179-3509 – TYPE A



THREE-PHASE, FOUR-WIRE UTILITY, 4-POLE ATS

0179-3509 – TYPE B



THREE-PHASE, FOUR-WIRE UTILITY, 3-POLE ATS

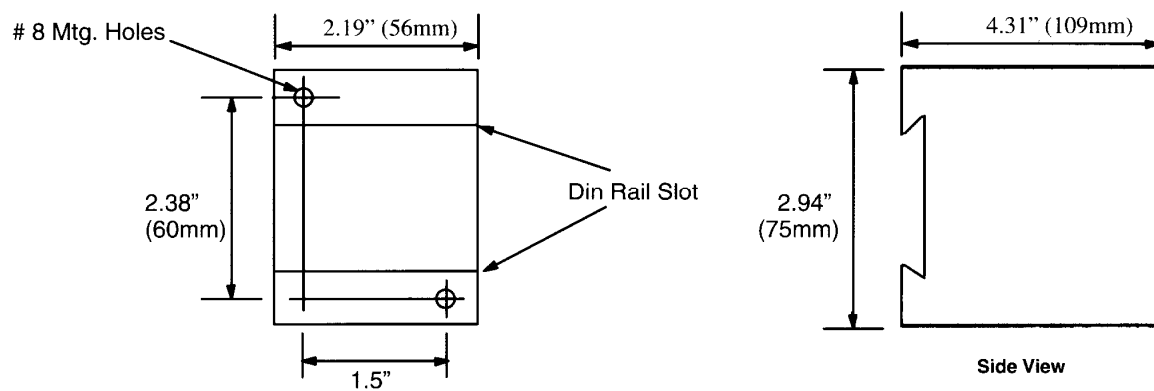
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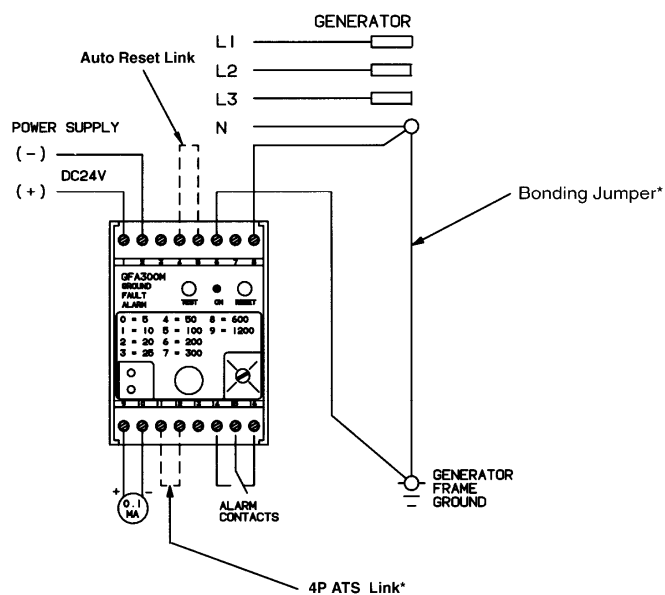


Outline detail



Weight: 19 oz (540 grams)

Interconnection detail



* Required only with separately derived systems. Bonding jumper is included in kit.

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Field installation kits

Accessory Kit #	Corresponding Production Part #	Critical Component	Used with Alt frame size 4 or 5	Used with Alt frame size 6 or 7	Feature Code	Miscellaneous	Instruction Sheet
0179-3244-05	0179-3244-03	0307-3003-01	X		H550	For use with PCC2100	C645
0179-3244-06	0179-3244-07	0307-3003-01		X	H550	For use with PCC2100	C645
0179-3244-09	0179-3244-08	0307-3003-01	X			For use with PCC2100	C645
0179-3428-02	0179-3428-01	0307-3003-01	X		H550	For use with PCC3200, PCC3201	C706
0179-3509-03	0179-3509-01	0307-3003-01		X	H667/H668	Ground Fault Kit – PCC2100/3100, 4-pole. Separately derived transfer switch (SDTS). Installation onto generator set equipped with or without set mounted circuit breaker box.	C656
0179-3509-04	0179-3509-02	0307-3003-01		X	H666	Ground Fault Kit – PCC3200, 4-pole NSDTS (H666) NON-separately derived transfer switch (NSDTS). Installation onto generator set equipped with or without set mounted circuit breaker box.	C656
0179-3509-07	0179-3509-05	0307-3003-01		X	H667/H668	Ground Fault Kit – PCC3200, 4-pole. Separately derived transfer switch (SDTS). Installation onto generator set equipped with or without set mounted circuit breaker box.	C656
0179-3509-08	0179-3509-06	0307-3003-01		X	H666	Ground Fault Kit – PCC3200, 3-pole. NON-separately derived transfer switch (NSDTS). Installation onto generator set equipped with or without set mounted circuit breaker box.	C656
0300-4582-05	0300-4582-03	0307-3003-01	X		H550	For use with PCC3100	C646

Feature descriptions

H550-2 = The unit is equipped with an adjustable sensor to detect a ground fault condition on the main alternator output. A fault condition illuminates an indicating lamp on the genset control panel. Sensor features include: -0 to 1.0 second adjustable time delay. Ground fault pickup settings: 100, 150, 200, 250, 300, 450, 600, 750, 800, 1200 Amps – “Test” and “Reset” buttons and functional condition indicating lights. Suitable for operating voltages up to 600 VAC.

H666-2-2 = The generator set is equipped with a current transformer and a ground fault indication relay for use with a 3-pole, non-separately derived transfer switch only, with or without a set mounted circuit breaker. The current transformer will be shipped loose and must be installed at the customer service entrance ground bond connection. Wiring from the current transformer must be brought back to set mounted relay. Other components included with this feature include a set mounted ground fault indication relay. The current transformer has a 4.25 inch round window.

H667-2-2 = The generator set is equipped with a current transformer and ground fault indication relay for use with a 4-pole, separately derived transfer switch and set mounted circuit breaker. The CT is mounted in the circuit breaker box mounted on the left side of the genset as viewed from the generator end. The genset neutral and ground are bonded.

H668-2-2 = The generator set is equipped with a current transformer and ground fault indication relay for use with a 4-pole, separately derived transfer switch and set mounted circuit breaker. The CT is mounted in the circuit breaker box mounted on the right side of the genset as viewed from the generator end. The genset neutral and ground are bonded.

Certification



ISO9001 - This product was designed and manufactured in facilities certified to ISO9001.

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Fax 44 1843 255902

Asia Pacific
10 Toh Guan Road #07-01
TT International Tradepark
Singapore 608838
Phone 65 6417 2388
Fax 65 6417 2399

Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect generator sets to any building electrical system except through an approved device or after building main switch is open.

Warning: For professional use only. Must be installed by a qualified service technician. Improper installation presents hazards of electrical shock and improper operation, resulting in severe personal injury and/or property damage.



Battery charger

A048G602 10 A 50/60 Hz

A051H785 20 A 50/60 Hz



Description

Cummins® fully automatic battery chargers are constant voltage/constant current chargers incorporating a 4-stage charging algorithm. Designed for use in applications where battery life and reliability are important; these chargers, complete with built-in equalize charge capability, are ideal for stationary or portable starting battery charging service.

To achieve optimum battery life, a 4-stage charging cycle is implemented. The four charging stages are constant current, high-rate taper charge, finishing charge, and maintaining charge. During the constant current cycle the charger operates at maximum possible output in the fast charge mode. During the high-rate taper charge cycle the charger stays at fast charge voltage level until battery current acceptance falls to a portion of the chargers rated output. During the finishing charge cycle the charger operates at the float voltage and completes the battery charge. During the maintaining charge cycle the charger supplies only a few milliamps required by the battery to stay at peak capability.

An optional temperature sensor (A043D534) may be used to adjust charging voltage based on temperature of the battery. Use of a battery temperature sensor helps to increase battery life by preventing over or under charging. The battery temperature sensor also protects the battery from overheating. Temperature compensation sensor is required for all applications when battery charger and battery are located in different temperature or battery heater is being used.

Battery chargers are field-configurable for charging either 12 or 24 VDC battery systems at 50/60 Hz operation. Simple jumper selectors enable selection of output voltage and battery type.

Features

Protection – Surge protected to IEEE and EN standards. All models include single pole cartridge type fuses mounted on the printed circuit board to protect against input or output overcurrent.

Easy installation – Clearly marked terminal blocks and panel knockouts provide convenient connections of input and output leads.

User display – Output voltage and current, fault information and status are indicated on the front panel. Includes precision ammeter and voltmeter.

Monitoring – Status LED indicators are provided to show the condition of the charger. LED's on the right side of the monitor indicate operational functions for Temperature Compensation active (Green), AC on (Green), Float (Green) or Boost (Amber) mode, as well as Battery Fault (Red). LED's on the left side of the monitor illuminate (in Red) when Charger fail, High or Low VDC or AC fail occur.

Adjustable float voltage – Float voltage can be set, using easy to understand jumpers, for optimum battery performance and life.

Construction – NEMA-1 (IP20) corrosion resistant aluminium enclosure designed for wall mounting.

Faults – The charger senses and annunciates the following fault conditions: AC power loss, battery overvoltage, battery under voltage, battery fault conditions and charger failure. Includes an individual 30 volt/2 amp isolated contact for each alarm.

Vibration resistant design – complies with UL991 class B vibration resistance requirements.

Listed – C-UL listed to UL 1236 CSA standard 22.2 No 107.2-M89. Suited for flooded and AGM lead acid and NiCd batteries in generator set installations.

Warranty – 5 year CPG warranty.



Status and Fault LED



Field selectable jumper

Specifications

Performance and physical characteristics

Output:	Nominal voltage	12VDC* or 24VDC
	Float voltage – 12VDC batteries	12.87, 13.08, 13.31, 13.50*, 13.62, 14.30
	Float voltage – 24VDC batteries	25.74, 26.16, 26.62, 27.00*, 27.24, 28.60
	Equalize-voltage	6.5% above float voltage sensing
	Output voltage regulation	±0.5% (1/2%) line and load regulation
	Maximum output current	10 or 20 amps nominal
	Equalize charging	Battery interactive auto-boost
Input:	Voltage AC	120, 208, 240 ±10%
	Frequency	60/50 Hz +5%
Approximate net weight:		10A: 25 lbs. (11.36 Kg) 20A: 50 lbs. (22.68 Kg)
Approximate dimensions: height x width x depth-in		10A: 12.50" x 7.66" x 6.50"(318 x 195 x 165 mm) 20A: 13.06" x 13.95" x 6.83"(332 x 354 x 173 mm)
Ambient temperature operation: At full rated output -		- 4 °F to 104 °F (-20 °C to 45 °C)

Note:

- Battery charger comes with default settings of 12VDC and 13.50/27.00VDC float voltage and can be changed to the battery manufacture recommendations. Replacement printed circuit board and f uses are identified in the Owner's Manual (10A: A050S537 and 20A: A051X126) which resides in Quick Serve On-Line. Service parts can be purchased through the Memphis Distribution Center. The PC board replacement instruction sheet (10A: A052N073, 20A: A053W929) and service manual (A050D829) is also available.
- Installation and application must comply with "section 4.5.3 batteries and battery charger" of application guide T-030 (Liquid Cooled Generator Set Application Manual A040S369).

Caution:

- Higher input voltages (i.e. 480VAC or 600VAC) can be applied if a transformer with a 120VAC-240VAC output is installed. Higher input voltages (i.e. 480VAC or 600VAC) can be applied if a transformer with a 120VAC-240VAC output is installed. For voltages higher than 240 VAC, stepdown transformer must be used. Review the respective Owner/Installation manual A050S537 for 10Amp and A051X126 20A chargers for supplier recommended stepdown transformer requirements.
- 10Amp battery charger is recommended for genset applications with 1 or 2 factory provided batteries. 20Amp battery charger is recommended for Cummins Genset applications with 3 or 4 factory provided batteries. Please consider the auxiliary DC loads connected to the genset batteries and size this charger as per the T-030 application guide to prevent misapplication issues.
- Back feed to a utility system can cause electrocution and/or property damage. Do not connect generator sets to any building electrical system except through an approved device or after building main switch is open.
- For professional use only. Must be installed by a qualified service technician. Improper installation presents hazards of electrical shock and improper operation, resulting in severe personal injury and/or property damage.
- Use this charger for charging LEAD-ACID or LIQUID ELECTROLYTE NICKEL-CADMIUM batteries only. Do not use this battery charger for charging dry cells, alkaline, lithium, nickel-metal hydride, or sealed nickel-cadmium batteries that are commonly used with home appliances. These batteries may burst and cause injuries to persons and damage to property.
- Do not parallel these battery chargers with any other charging system.

For more information contact your local Cummins distributor
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PowerCommand[®] Network Communications Module PCC3200/3201



Description

The PCC3200 Network Communications Module (NCM) provides an interface for a PowerCommand Genset to the PowerCommand network. The NCM is easily installed inside the generator control box without additional wiring, conduit or external enclosures.

The NCM allows local or remote monitoring and control of the PowerCommand Genset. The NCM allows a user to start, stop and emergency stop or reset a fault of the genset. The NCM may be configured for automatic alarm dial-out of genset fault conditions.

Specifications

Network

Echelon[®] LonWorks[®], twisted-pair 78 KBPS, FT-10

Protocol

Echelon LonWorks, GOAL

Power

Provided by PowerCommand Generator Control

Features

- Provides simple real-time access to all necessary PowerCommand PCC 3200 Genset data.
- Automatic indication of genset warning and shutdown conditions to a user-defined location.
- May be connected at any point in the PowerCommand network.
- Module firmware can be upgraded in the field.
- May be remotely monitored and controlled with PowerCommand software for Windows[®] V 2.01.
- Plugs easily into genset control requiring no additional wiring, conduit or external enclosures.
- Less wiring makes installation and system upgrades quick and easy.

Temperature

Operating: -25 to +70 °C (-13 to +158 °F)

Storage: -25 to +80 °C (-13 to +176 °F)

Humidity

Relative 25 - 90% (non-condensing)

Monitoring information available

Generator	Engine	Status
Voltage (3-phase)	Engine speed	Switch position
Current (3-phase)	Engine temperature (L & R)	Genset status
Percent current	Exhaust temperature (L & R)	Number of starts
Percent load	Oil pressure	Model
Power factor	Oil temperature	Rating
Frequency	Low/high battery voltage	Fault status
Real power	Run time	Load demand setting
Energy	Pre-low oil pressure	Load ramp setting
Ground fault	Pre-high engine temperature	Load tracking
High/low AC voltage	Overspeed	
Reverse kW	Low coolant level	
Reverse kVAR	Low fuel level	
Overload	AC charger failure	

Annunciation available*

NFPA 110	AC alarms	Paralleling
High battery voltage	Customer fault 2	Emergency stop
Low battery voltage	Customer fault 4	Pre-low oil pressure
Genset running	High AC voltage	Low oil pressure
Pre-low oil pressure	Low AC voltage	Pre-high engine temp
Low oil pressure	Under frequency	High engine temp
Pre-high engine temp	Overcurrent	Low engine temp
High engine temp	Short circuit	Overspeed
Low engine temp	Reverse power	Fail to start
Overspeed	Loss of field	Not in automatic
Fail to start	Loss of AC input	Low coolant level
Not in automatic	Fail to synchronize	Fail to synchronize
Low fuel	Fail to close	Fail to close
Low coolant level	Overload	Reverse power
	Emergency stop	Loss of field
	Communications failure	Overload
	Common alarm	Under frequency

* Variations are not available.

Ordering information

Part number	Description
0541-0809	PCC3200 Network Communications Module (NCM), FT-10 (KP60-2)

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**Southern
Plains**

INSTRUCTION OF OPERATIONS AND MAINTENANCE PERSONNEL

Generator

PROJECT:

Training will be conducted by a factory-trained maintenance specialist in engine / generator maintenance and service. Training duration will be approximately 1 hour with a question and answer session to last as long as needed to satisfy owner.

LESSON PLAN

- I. Safety
 - a. General safety precautions
 - b. Equipment safety code
 - c. Electrical shock and arc flash
- II. Equipment Operation
 - a. Engine/generator operation process
 - b. Fundamental operating principals of the engine/generator
 - c. Identify all components of equipment – mechanical, electrical, and electronic
 - i. Standard operating procedures – start-up, monitoring, and shut-down
- III. Component Description
 - a. Identify each component's function – Engine/generator and Automatic Transfer Switch and their relationship to one another (if applicable)
- IV. Preventive Maintenance
 - a. Inspection Procedures
 - i. Inspection with equipment in operation
 - ii. Potential trouble symptoms
 - iii. Planned maintenance requirements and intervals
 - b. Procedures for testing equipment after maintenance has been performed
- V. Service Events
 - a. Alarms / Display Messages
 - b. Procedures
 - i. E-stop reset
 - c. Symptom list
 - d. Equipment Troubleshooting
 - e. Probable Cause & Recommended Correction

“HANDS-ON” DEMONSTRATION

The instructor will demonstrate the engine/generator functionality in auto and manual modes.

Disclaimer

Training is for informational purposes only. If you have any specific safety or operational questions refer to the Operators Manual and/or Sequence of Operations documentation.



Project Name: _____ **Project #:** _____ **kW Rating:** _____

Contact Name: _____ **Phone:** _____ **Email:** _____

Site Address: _____ **City:** _____ **State:** _____

Mounting:

- ☐ Generator set is level and has been properly secured.
☐ No airflow obstructions to the engine or generator are present for cooling or combustion.
☐ Appropriate access has been provided to all doors and control panels. (Enclosure doors can be fully opened)

Fuel:

- ☐ Flexible fuel supply line connection has been installed between the rigid piping and the generator base frame.
☐ Fuel supply isolation valve has been installed at generator set.

Diesel:

- ☐ Main tank and day tanks have been filled with fuel. Fuel transfer-pump system installation is complete and operational.

LPG or Natural Gas:

- ☐ LPG supply tank is 80% full.
☐ Fuel supply lines have been properly sized and installed to provide correct gaseous fuel flow rate.
☐ Inline gaseous fuel regulator installed with inlet and outlet pressure test ports available.
☐ Gaseous fuel available at the required pressure. (Refer to engine service manual for specification)

Engine:

- ☐ Engine oil has been installed and at the proper level.
☐ Engine coolant has been installed and at proper level. All secondary cooling water systems are available and operational.

Exhaust:

- ☐ Engine exhaust has been properly run and secured from the engine outlet to the exhaust outlet.
☐ Exhaust flex and other exhaust joints have been properly bolted/clamped together and sealed.

Electrical:

- ☐ Main AC power cables have been pulled, labeled, and properly landed at the generator set and the transfer switch.
☐ Generator start/stop control wires have been pulled from the transfer switch to the generator set control panel.
☐ Battery charger/jacket water heater AC circuit stranded wires have been pulled to generator set control panel-from appropriate sized and labeled circuit breaker.
☐ AC wires have been pulled in separate conduit from any control or network wiring
☐ Generator set frame has been properly grounded to earth ground rod or earth grounding grid
☐ Flexible conduit electrical connections have been made to the generator set
☐ All electrical and any medium voltage wiring/terminations have been performed and verified by a licensed electrician.
☐ If applicable: remote panels have been mounted and all necessary wiring has been pulled to the generator control panel. Connections have been made at the remote panel and wiring has been properly labeled at the generator control panel.

Network:

- ☐ Has the proper network cable been pulled to the generator control section?
LON Network (Beldin 1752A) ☐ PCC Network (Beldin 9729) ☐
☐ Have the network cable(s) been pulled in separate conduit from AC power cables? Yes ☐ No ☐

Day of Start Up:

- ☐ Contractor representative must be present at the time of start up. End user representative(s) must be present in order for operator training to be performed during the same visit.
☐ Utility power must be available at the time of start up.
☐ A test of the transfer switch will be required at start up - requiring a short interruption of facility power. Prior authorization must be obtained from the end user.
☐ Is the generator set accessible by our field service vehicle and/or load-bank or other test equipment? Yes ☐ No ☐
☐ Will an electrician, mechanical installer, and/or plumber be present to make any last minute changes? Yes ☐ No ☐
☐ If the associated switchgear and/or ATS(s) are not Onan/Cummins, will the manufacturer's representative be on site? Yes _____ No _____
☐ If a loadbank test is required: Access for equipment/cable runs must be made available. (Note: Unable to loadbank test during rain or other precipitation)
☐ Generator Set Exercise: Day: [_____] Time: [_____] Exercise with or without load? [_____]

Contractor Signature _____

Printed Name _____

Please complete this form and return to schedule start-up. I understand that the start-up date may have to be rescheduled at my expense if the above items have not been completed properly.

Return this completed form to: **Person:** _____ **Phone:** _____

Email: _____ **Fax:** _____



Warranty Statement

Generator Sets

Commercial Standby Extended Warranty

Limited Standby 5 Year or 2,500 Hour Parts + Labor + Travel Extended Warranty – L189

Commercial Generating Set

When purchased, this limited extended warranty applies to all Cummins Power Generation® branded commercial generating sets and associated accessories (hereinafter referred to as "Product").

This warranty covers any failures of the Product, under normal use and service, which result from a defect in material or factory workmanship.

Warranty Period:

The warranty start date is the date of initial start up, first rental, demonstration or 18 months after factory ship date, whichever is sooner. The coverage duration is 5 years from warranty start date or 2,500 hours, whichever occurs first.

Emergency Standby Power (ESP) is defined as the maximum power available during a variable electrical power sequence, under the stated operating conditions, for which a generating set is capable of delivering in the event of a utility power outage. The permissible average power output over 24 hours of operation shall not exceed 70% of the ESP.

Cummins Power Generation® Responsibilities:

In the event of a failure of the Product during the extended warranty period due to defects in material or workmanship, Cummins Power Generation® will only be responsible for the following costs:

- All parts and labor required to repair the Product.
- Reasonable travel expenses to and from the Product site location.
- Maintenance items that are contaminated or damaged by a warrantable failure.

Owner Responsibilities:

The owner will be responsible for the following:

- Notifying Cummins Power Generation® distributor or dealer within 30 days of the discovery of failure.
- Installing, operating, commissioning and maintaining the Product in accordance with Cummins Power Generation®'s published policies and guidelines.
- Providing evidence for date of commissioning.
- Providing sufficient access to and reasonable ability to remove the Product from the installation in the event of a warrantable failure.

In addition, the owner will be responsible for:

- Incremental costs and expenses associated with Product removal and reinstallation resulting from non-standard installations.
- Costs associated with rental of generating sets used to replace the Product being repaired.
- Costs associated with labor overtime and premium shipping requested by the owner.
- All downtime expenses, fines, all applicable taxes, and other losses resulting from a warrantable failure.

Limitations:

This limited extended warranty does not cover Product failures resulting from:

- Inappropriate use relative to designated power rating.
- Inappropriate use relative to application guidelines.
- Failures due to normal wear, corrosion, varnished fuel system parts, lack of reasonable and necessary maintenance, unauthorized modifications and/or repair, and use of add-on or modified parts.
- Improper and/or unauthorized installation.
- Owner's or operator's negligence, accidents or misuse.
- Noncompliance with any Cummins Power Generation® published guideline or policy.
- Use of improper or contaminated fuels, coolants or lubricants.
- Improper storage before and after commissioning.
- Owner's delay in making Product available after notification of potential Product problem.
- Replacement parts and accessories not authorized by Cummins Power Generation®.
- Use of Battle Short Mode

Limitations Continued:

- Owner or operator abuse or neglect such as: operation without adequate coolant or lubricants; overfueling; overspeeding; lack of maintenance to lubricating, cooling or air intake systems; late servicing and maintenance; improper storage, starting, warm-up, run-in or shutdown practices, or for progressive damage resulting from a defective shutdown or warning device.
- Damage to parts, fixtures, housings, attachments and accessory items that are not part of the generating set.

This limited extended warranty does not cover costs resulting from:

- Difficulty in gaining access to the Product.
- Damage to customer property.
- Repair of cosmetic damage to enclosures.

Items not covered by this limited extended warranty:

- Batteries
- Enclosures
- Coolant heaters
- Exhaust systems and aftertreatment components
- Maintenance items

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CUMMINS POWER GENERATION® RIGHT TO FAILED COMPONENTS:

Failed components claimed under warranty remain the property of Cummins Power Generation®. Cummins Power Generation® has the right to reclaim any failed component that has been replaced under warranty.

THE WARRANTIES SET FORTH HEREIN ARE THE SOLE WARRANTIES MADE BY CUMMINS POWER GENERATION ® IN REGARD TO THE PRODUCT. CUMMINS POWER GENERATION® MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

IN NO EVENT IS CUMMINS POWER GENERATION® LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

This limited extended warranty shall be enforced to the maximum extent permitted by applicable law. This limited extended warranty gives the owner specific rights that may vary from state to state or from jurisdiction to jurisdiction.

Product Model Number: _____

Product Serial Number: _____

Date in Service: _____