Waller County, Texas
Invitation for Bid

Prairie View Water Plant #2 Generator Project
for Waller County
GLO Contract No. 24-065-016-E173
BID 26-012

SUBMIT BIDS TO:

Waller County
County Judge's Office
836 Austin Street, Suite 4300
Hempstead, TX 77445

SUBMIT NO LATER THAN:

Thursday, August 20, 2026
1:00 PM (CST)

ENVELOPE TO BE LABELED:

Bid 26-012
Generator Project

ALL BIDS MUST BE RECEIVED AND TIME/DATE STAMPED BY THE COUNTY JUDGE'S OFICE OF WALLER COUNTY ON OR BEFORE THE SPECIFIED TIME/DATE STATED ABOVE.
BIDS RECEIVED AS REQUIRED WILL BE OPENED AND PUBLICLY READ AFTER DUE DATE.
BIDS RECEIVED AFTER THE SPECIFIED TIME WILL BE RETURNED UNOPENED.

Results will not be given by phone. Results will be provided to bidder in writing after Commissioners Court award. Requests for information must be in writing and directed to Jaime Kovar, Purchasing Director, j.kovar@wallercounty.us

Vendor Responsibilities:

- Download and complete any addendums posted on the Waller County website.
- Submit response in accordance with requirements stated in the document.
- DO NOT submit responses via email, as they will not be accepted.

Invitation for Bids

SECTION 1. GENERAL REQUIREMENTS

1.1 Entire Document: Read this entire document carefully. Follow all instructions. You are responsible for fulfilling all requirements and specifications. Be sure you understand them.

1.2 Applicability: General Requirements apply to all advertised Invitations for Bid; however, these may be superseded, in whole or in part, by the scope, special requirements, specifications, special specifications or other data contained herein.

1.3 Governing Law: Bidder is advised that these requirements shall be fully governed by the laws of the State of Texas and that Waller County may request and rely on advice, decisions and opinions of the Attorney General of Texas and the Waller County District Attorney concerning any portion of these requirements.

1.4 Bid Form Completion: Complete one (1) bid form, sign, and return with completed submittal to County Judge's Office of Waller County. An authorized representative of the Bidder must sign the Contract Sheet. The contract will be binding only when approved by the Waller County Commissioners Court, signed by the County Judge of Waller County and a purchase order authorizing the item(s) desired has been issued. The use of corrective fluid is not acceptable and may result in the disqualification of bid. If an error is made, the bidder must draw a line through the error and initial each change.

If an Excel pricing form is included and/or posted on the County's website amongst this Invitation for Bid, the vendor must download, complete, and save the Excel file (not a PDF of the Excel file) of the pricing form on a flash drive. The Excel file on the flash drive must be downloadable by the Purchasing Director in order to copy and paste the Bidder's pricing to the County's tabulation. The flash drive must be labeled and included in the same sealed envelope with the respondent's completed Bid along with a printed copy of the pricing form completed by the vendor.

1.5 Bid Returns: Bidders must return a completed Bid Package in a sealed envelope to the County Judge's Office of Waller County, 836 Austin Street, Suite 4300, Hempstead, TX 77445, no later than 1:00 P.M. (CST) on the date specified. The Bid Package is the set of documents outlining the requirements and details of the Project that is provided by the County to potential Bidders, and the complete, properly signed Bid. Late bids will not be accepted.

1.6 Addenda: No interpretation of the meaning of the drawings, specifications or other bid documents will be made to any bidder orally. All requests for such interpretations must be made in writing addressed to Jaime Kovar, Procurement Director by email at: J.Kovar@wallercounty.us. Any and all interpretations and any supplemental instructions will be in the form of written addenda to the contract documents which will be posted on Waller County's website. Addenda will ONLY be issued by the Waller County Procurement Director. It is the sole responsibility of each bidder to insure receipt of any and all addenda. All addenda issued will become part of the Contract Documents. Bidders must sign and include any and all issued addenda in the returned bid package. **The deadline for submission of questions and/or clarification is no later than August 12, 2026, at 10:00 AM (CST).** Requests received after the deadline will not be responded to due to the time constraints of this bid process.

1.7 References: All Bidders must submit, WITH BID, at least three (3) references from clients for whom a project similar to that specified herein has been successfully accomplished. References must include clients' name, contact person, and telephone number.

1.8 Bid Bond: All Bidders must submit, WITH BID, a cashier's check or certified check for at least five percent (5%) of the total bid price, payable to the order of Waller County, or a Bid Bond in the same amount issued by a surety, acceptable to Waller County, authorized to do business in the State of Texas, as a guarantee that the Bidder will do the work described herein at the rates stated herein. The cashier's check or certified check submitted by an unsuccessful Bidder will be returned only after a written request to do so has been received by the Procurement Director.

1.9 Material Safety Data Sheets: Under the "Hazardous Communication Act", commonly known as the "Texas Right to Know Act", a Bidder must provide to Waller County and using departments, with each delivery, material safety data sheets, which are, applicable to hazardous substances defined in the Act. Bidders are obligated to maintain a current, updated file in Waller County. Failure of the Bidder to maintain such a file will be cause to reject any bid applying thereto.

1.10 Pricing: Prices for all goods and/or services shall be firm for the duration of the Contract and shall be stated on the bid sheet. The Bid submitted to the County shall be inclusive of all costs necessary to complete the Project. No price changes, additions, or subsequent qualifications will be honored during the course of the Contract, unless made in accordance with the Contract's General Terms and Conditions. All prices must be written in ink or typewritten.

1.11 Term Contracts: If the Contract is intended to cover a specific time period, said time will be given in the specifications under Scope.

1.12 Recycled Materials: Pursuant to Texas Health and Safety Code § 361.426, Waller County encourages the use of products made of recycled materials and shall give preference in purchasing to products made of recycled materials if the products meet applicable specifications as to quantity and quality. Waller County will be the sole judge in determining product preference application.

1.13 Evaluation: Evaluation shall be used as a determinant as to which bid items or services are the most efficient and/or most economical for Waller County. It shall be based on all factors which have a bearing on price and performance of the items in the user environment. All Bids are subject to tabulation by the Procurement Director and recommendation to Waller County Commissioners Court. Compliance with all bid requirements, delivery, and needs of the using department are considerations in evaluating bids. Pricing is NOT the only criteria in determining the lowest responsible bidder, or for making a recommendation. The Waller County Procurement Director reserves the right to contact any Bidder, at any time, to clarify, verify, or request information with regard to any Bid.

1.14 Disqualification of Bidder: Upon signing the Contract Sheet, a Bidder offering to provide supplies, materials, services, or equipment to Waller County certifies that the Bidder has not violated the antitrust laws of this state codified in section 15.01, et seq., Business & Commerce Code, or the federal antitrust laws, and has not communicated directly or indirectly the bid made to any competitor or any other person engaged in such line of

business. Any and all Bids may be rejected if Waller County believes that collusion exists among the Bidders. Bids in which the prices appear to be unbalanced may be rejected. If multiple Bids are submitted by a Bidder and after the Bids are opened, one of the Bids is withdrawn, the result will be that all of the Bids submitted by that Bidder will be withdrawn; however, nothing herein prohibits a vendor from submitting multiple Bids for different products or services.

1.15 Awards: Waller County reserves the right to award the Contract to the lowest responsible bidder in accordance with the laws of the State of Texas, to waive any formality or irregularity, to make awards to more than one Bidder, and to reject any or all Bids.

1.16 Contract Obligation: A Bid does not become binding upon the Bidder until it is accepted by official action of the Waller County Commissioners Court, and a Contract does not become binding on the County of the Bidders until it is approved by official action of the Waller County Commissioners Court and executed by the County Judge or another person authorized by the Waller County Commissioners Court. Department heads are not authorized to sign agreements for Waller County. Binding agreements shall remain in effect until all products and/or services covered by this purchase have been satisfactorily delivered and accepted.

SECTION 2. PRE-BID CONFERENCE

2.1 Pre-Bid Conference: There is no pre-bid conference for this project.

SECTION 3. SCOPE

3.1 Scope:

It is the intent of Waller County to contract with one (1) vendor for all materials, supplies, equipment, tools, services, labor, and supervision necessary to furnish and install a new diesel standby generator at the existing water plant to provide backup power for critical water plant facilities during utility power outages. Location address is: 36132 Cameron Road, Prairie View, TX 77446

The project will be financed with assistance from the General Land Office (GLO) under the U.S. Department of Housing and Urban Development Community Development Block Grant - Mitigation (CDBG-MIT) program and is subject to all applicable Federal and State laws and regulations. Attention is called to the fact that not less than, the federally determined prevailing Davis-Bacon and Related Acts wage rate, as issued by the Department of Labor and contained in the contract documents, must be paid on this project. In addition, the successful bidder must ensure that employees and applicants for employment are not discriminated against because of race, color, religion, sex, sexual orientation, gender identity, or national origin. Adherence to the Waller County's Section 3 Policy is required for all contracts.

All contractors and subcontractors must be cleared (not suspended or debarred) prior to any formal action authorizing the award of a contract to the contractor. Minority Business Enterprises, Small Business Enterprises, Women Business Enterprises, Veteran-Owned Businesses, Section 3 Businesses, and labor surplus area firms are encouraged to submit bids.

Waller County reserves the right to reject any or all bids or to waive any informalities in the bidding. Bids may be held by Waller County for a period not to exceed 60 days from the date

of the bid opening for the purpose of reviewing the bids prior to the contract award.

SECTION 4. ESTIMATED BUDGET AND PROJECT COMPLETION DATE

4.1 Estimated Budget: $369,000

4.2 Estimated Completion Date: Three hundred sixty-five (365) calendar days, beginning on the issuance date of the Notice to Proceed.

SECTION 5. ENCLOSURE

5.1 Enclosure #1: Specifications and Plans

SECTION 6. PRICING

6.1 Excel Bid Pricing Form: Bidders are required to obtain and complete the Excel Bid Pricing Form on the Waller County website and return to County Judge's Office, as stated in Section 1.4 and 1.5.

SECTION 7. PERFORMANCE AND PAYMENT BONDS

7.1 Bonds Required: The Bidder must provide to the County a payment bond and performance bond, each in the amount of 100% of the total Contract Price. Bonds must be submitted to the Procurement Director within ten (10) calendar days after receipt of notification of bid award. Such bonds shall be executed by a solvent surety company duly authorized to do business and licensed in the State of Texas to issue surety bonds with a Best Rating of A/VII or better. Waller County reserves the right to accept or reject any surety company proposed by the Contractor. In the event Waller County rejects the proposed surety company, the Contractor will be afforded five (5) additional days to submit the required bonds issued by a surety company acceptable to Waller County.

An attorney-in-fact or agent who signs a bid bond, performance bond, or payment bond must file with each bond a certified and effectively dated copy of his or her power of attorney or authority to act.

SECTION 8. REQUIRED FORMS

8.1 Required Forms: All Bidders are required to complete and return with their Bids the following forms:

a. Electronic Excel file of Pricing Form on flash drive and printed hard copy

b. Bidder's Business Information Sheet

c. Contract Special Terms & Conditions

d. Contract Sheet

e. W-9 Form

f. Texas Ethics Commission Form 1295:

i. Effective January 1, 2016 all contracts executed by Commissioners Court, regardless of the dollar amount, will require completion of Form 1295 "Certificate of Interested Parties", as required by Texas Government Code §2252.908. All vendors submitting a response to a formal Bid, RFP, SOQ or any contracts, contract amendments, renewals or change orders are

required to complete the Form 1295 online through the State of Texas Ethics Commission website. Please visit: https://www.ethics.state.tx.us/filinginfo/1295/.

ii. On-line instructions:

a. Name of governmental entity is to read: Waller County, Texas.

b. Identification number used by the governmental entity is: B26-012.

c. Description is the title of the solicitation: Generator Project.

g. Federal Forms

SECTION 9. AWARD

9.1 Award: The contract will be awarded to the overall lowest responsible bidder.

Bidder's Business Information Sheet

By submitting a Bid, Bidder is seeking to enter into a legal contract with the County. As such, a Bidder must be an individual or a legal business entity capable of entering into a binding contract. Bidders must completely and accurately provide the information requested below or your Bid may be deemed non-responsive.

Name of Company:

_____

Type of Business (please check one):

☐ Individual/Sole Proprietor

☐ Corporation

☐ Limited Liability Company

☐ Partnership

☐ Other

If other, please specify _____

State of Incorporation (if applicable): _____

Federal Employer Identification Number: _____

Principal Place of Business Address: _____

_____.

Name and Address for Notices to be Sent Under Contract General Terms and Conditions Section 18.19:

_____

_____.

List any other names the Company uses, or is known by (dba, aka, etc.):

_____

_____.

_____ _____

Company Name Date

_____ _____

Signature of Authorized Company Official Printed Name

_____

Email address

Contract General Terms and Conditions

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SECTION 1. DEFINTIONS

1.1 Addendum: Written instruments issued by Waller County which clarify, correct, or change the bidding requirements or the Contract Documents prior to the Due Date.

1.2 Authorized Representative: The Waller County Engineer.

1.3 Bid: A complete, properly signed response to an Invitation for Bid that, if accepted, would bind the Bidder to perform the resultant contract.

1.4 Bidder: A person, firm, or entity that submits a Bid in response to an Invitation for Bid.

1.5 Bid Documents: The advertisement or Invitation for Bids, Bid form, the Price Sheet, the Contract Sheet, Specifications and Plans, the Special Terms and Conditions Form, the Contract General Terms and Conditions, Bidder's Business Information Sheet, Form, and Addenda.

1.6 Calendar Day: Any day of the week, no days being excepted.

1.7 Construction Site: The area designated by the County where construction work on the Project is carried out.

1.8 Contract: The binding legal agreement between the County and the Contractor. The Contract represents the entire and integrated agreement between the County and the Contractor for performance of the Work, as evidenced by the Contract Documents.

1.9 Contract Price: the moneys payable by the County to the Contractor for completion of the Work in accordance with the Contract Documents.

1.10 Contract Sheet: the form provided in the Bid Documents.

1.11 Contract Time: The number of days allowed for completion of the Work as defined by the Contract Sheet. When any period is referred to in days, it will be computed to exclude the first and last day of such period. A day of twenty-four hours measured from midnight to the next midnight will constitute a day.

1.12 Contractor: The individual, firm, corporation, or other business entity with whom the County has entered into the Contract for the performance of the Work.

1.13 County: Waller County, Texas, a political subdivision of the State of Texas.

1.14 Design Engineer: Firm: Pape-Dawson
Houston, Texas

1.15 Design Engineer Representative: The authorized representative of the Design Engineer who may be assigned to the site or any part thereof.

1.16 Drawings: Those portions of the Contract Documents which are graphic representations of the scope, extent and character of the Work to be furnished and performed by Contractor, and which have been approved by the County. Drawings may include plans, elevations, sections, details, schedules, and diagrams. Shop Drawings are not included in the definitions of Drawings.

1.17 Due Date: The date and time specified for receipt of Bids.

1.18 Final Completion: The point in time when the County determines that all Work has been completed and final payment to Contractor will be made in accordance with the Contract Documents.

1.19 Invitation for Bid ("IFB"): A solicitation requesting pricing for a specified good or service which has been advertised for Bid in a newspaper.

1.20 Minor Change: A written change in the Work that is ordered by the Authorized Representative, that does not change the Contract Price or Contract Time, and is consistent with the scope of the Contract.

1.21 Notice to Proceed: A written notice given by the Authorized Representative of the County to Contractor identifying the date on which the Work will commence, and on which Contractor shall start to perform Contractor's obligations under the Contract Documents.

1.22 Project: the Reconstruction of Adams Flat Road as specified in the Contract Documents.

1.23 Schedule of Values: an itemized list of each activity and all materials and labor required to complete the Project, and the corresponding values of each. When summed up, the Schedule of Values shall equal the total Contract Price.

1.24 Shop Drawings: All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor as required by the Contract Documents.

1.25 Specifications and Plans: Those portions of the Contract Documents 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, equipment, and services in order to render a completed and useful project.

1.26 Subcontractor: An individual, firm, corporation, or other business entity having a direct contract with Contractor for the performance of a portion of the Work under the Contract.

1.27 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 that the County can occupy or utilize the Work for its intended use, as evidenced by a Certificate of Substantial Completion approved by the County.

1.28 Superintendent: The representative of Contractor authorized in writing to receive and fulfill instructions from the Authorized Representative, and who shall supervise and direct construction of the Work.

1.29 Supplier: An individual or entity that furnishes materials or equipment to be incorporated in the Work by the Contractor or any Subcontractor.

1.30 Transfer Date: the date on which the care, custody, and control of the Project passes to Waller County.

1.31 Work: The entire completed construction, or the various separately identifiable parts thereof, required to be furnished under the Contract Documents. It includes the procurement, delivery, and proper construction and/or installation of all materials, facilities, and associated appurtenances necessary to fulfill the winning Bidder's obligations under the Contract, including the coordination and administration of all

services necessary for the Contractor, its agents, and/or subcontractors to fulfill Contractor's obligations under the Contract.

SECTION 2. CONTRACT DOCUMENTS

2.1 The Contract Documents: The Contract Documents are composed of the following:

a. Contract Sheet
b. Invitation for Bid
c. Bid Form
d. Specifications and Plans
e. Contract Special Terms and Conditions, if any
f. Contract General Terms and Conditions
g. Bidder's Business Information Sheet
h. Forms

2.2 Intent: The purpose 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 indicated by the Contract Documents. The Contract Documents are complimentary, and what is required by one shall be as binding as if required by all.

2.3 Exclusion of Professional Services: Contractor shall neither perform nor provide professional services as defined by Texas Government Code Chapter 2254 under this Contract.

2.4 Order of Precedence: In the event of a conflict between any of the Contract Documents, they shall be given precedence in the order provided in Section 2.1.

2.5 Interpretation: In the event of any dispute concerning the terms of the Contract Documents, the County's interpretation shall govern.

SECTION 3. PROJECT DURATION

3.1 Project Timeline: Bidder agrees to complete all work required by the Contract Documents as indicated on the Contract Sheet after issuance of a purchase order by the County, and issuance of a Notice to Proceed by the Authorized Representative. The Contract Time will begin to run on the date the Notice to Proceed is issued.

3.2 Liquidated Damages: The Contractor or its surety shall be liable for liquidated damages for the failure of the Contractor to timely complete the Work or any portion thereof within the Contract Time. The Contractor shall pay the County one thousand five hundred dollars ($1,500) per day for each calendar day beyond the scheduled completion date specified herein, unless the contract time has been adjusted by a Change Order. If the Contractor pays liquidated damages to the County, the County will place the Contractor on one (1) year probation. The County will issue written notice to the Contractor of the probation, and the one (1) year probation period will begin to run on the date of issuance of the written notice. If the Contractor becomes responsible for liquidated damages on any other project

during the probation period, the Contractor will be disqualified from any County work for a period of two (2) years, beginning on the issuance date of the written notice of the one (1) year probation period.

SECTION 4. CONTRACTOR'S RESPONSIBILITY FOR WORK

4.1 Preconstruction Work: Contractor shall perform the following preconstruction work upon written request from the County:

a. Cause Contractor's personnel to meet with the County and the Design Engineer to discuss the status of the Project;

b. Review drawings and specifications with the Design Engineer to determine the Project's compliance with applicable codes; and

c. Submit to the Road & Bridge Department a 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 must be broken out by trade and split between materials and labor. Prices will be deemed to include an appropriate amount of overhead and profit applicable to each item of Work. The Schedule of Values must be prepared in such form and supported by such data to substantiate its accuracy as the Road & Bridge Department may require.

4.2 Construction Work: Contractor shall perform the following construction work:

a. All preparatory work at the Construction Site identified herein, including but not limited to: soil and concrete testing, demolition of improvements existing at the construction site, and any other actions necessary for construction to begin in compliance with all laws and regulations pertaining to the Project, including those related to archaeological and environmental requirements.

b. Construct and install the Project on the construction site in accordance with the Contract Documents.

c. Furnish all materials, supplies, equipment, tools, labor, supervision, utilities, transportation, and other materials and services necessary to complete the Project.

4.3 Reporting and Resolving Discrepancies: If, during the performance of the Work, the Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provisions of any such law or regulation applicable to the performance of the Work or of any such standard, specification, manual or code, or instructions of any Supplier, Contractor shall not proceed with the Work affected thereby until an amendment or supplement to the Contract Documents has been issued. The Contractor shall be liable to the County for failure to report any such conflict, error, ambiguity, or discrepancy of which Contractor knew or reasonable should have known.

4.4 Reporting Design Defects: The Contractor shall provide written disclosure to the County if the Contractor learns of a defect, inaccuracy, inadequacy, or insufficiency in the Contract Documents, plans, specifications, or other design documents that the Contractor discovers, or reasonably should have discovered by the use of ordinary diligence. The Contractor shall provide written disclosure within a reasonable time of learning of the defect, but not later

than two (2) days after the discovery. Contractor shall not proceed with the Work affected thereby until instructed in writing by the Authorized Representative. If the Contractor fails to disclose a defect under this section of which the Contractor knew or reasonably should have known, the Contractor shall be liable to the County for the consequences of the defect(s) that result from the failure to disclose.

4.5 Minor Changes in the Work: Waller County acknowledges that in order to accomplish the efficient completion of the Project within the Contract Time, the Contractor may submit requests for Minor Changes in writing to the Authorized Representative in stages for approval or consent. Upon any request for a Minor Change submitted by the Contractor for review and approval, the Authorized Representative shall review the same, and shall diligently and promptly give the Contractor written notice of the Authorized Representative's approval or disapproval. The written approval or disapproval will be provided to the Contractor no later than fourteen (14) calendar days after receipt of the written request for Minor Change . If disapproved, the Authorized Representative's written decision shall set forth in detail all reasons for the disapproval. The Authorized Representative's right to disapprove any Minor Change shall be limited to the elements that: (a) do not conform substantially to matters previously approved, (b) have not been previously presented and approved, and that the Contractor fails to demonstrate is reasonably necessary for completion of the Project, or (c) are violations of this Contract or applicable laws and regulations.

4.6 Change Orders: A Change Order is required for all changes in the Project that require (a) an adjustment in the Contract Price, (b) an adjustment in the Contract Time, or (c) a material change in the overall scope or function of the Project. Change Orders may only be approved by the Waller County Commissioners Court. A Change Order must be approved before Contractor commences such change. Such procedure shall be the exclusive means to effect such changes in the Project.

a. If at any time Waller County desires to make any change in the Project requiring the issuance of a Change Order, Waller County will provide the Contractor with a written notice describing the change. Within a reasonable period of time after receiving such notice, the Contractor shall provide Waller County with a Change Order that describes the proposed change, and proposes changes, if any, to the Contract Price, the Schedule of Values, and the final completion date. Once the Contractor has provided a Change Order, the County will provide a written approval or disapproval of the Change Order not later than the 28th calendar day after receipt of the proposed Change Order. Upon approval of the Change Order, the Contractor shall perform the work in accordance with such Change Order. All work performed pursuant to a Change Order shall be performed in accordance with the terms of this Contract.

b. No action, acquiescence, or inaction by Waller County or any representative of Waller County shall be construed to be a waiver of requirements set forth in this Contract in regard to Change Orders, or as a ratification of a violation of such requirements. All acts in violation of this provision shall be considered void.

c. A Change Order is only effective if it is approved by the Waller County Commissioners Court, and signed by an authorized representative of both the County and the Contractor.

d. The Contract Price and the Schedule of Values shall be adjusted only as a result of a Change Order requiring such adjustment. Any extra work performed without a proper Change Order shall be considered voluntary and not subject to additional compensation.

4.7 Review and Approval of Changes: If the County disapproves of a Minor Change or Change Order, the Contractor shall have the right to alter such Minor Change or proposed Change Order to the satisfaction of the County, and resubmit the matter for evaluation. Any resubmission shall be subject to review and approval by the County.

a. The County and the Contractor shall attempt in good faith to resolve any disputes concerning a Minor Change or Change Order expeditiously, so as not to delay the completion of the Project in accordance with this Contract.

b. Waller County recognizes the importance of expeditious action upon all matters submitted to the County for review and approval, and of expeditious response to those aspects of the Project which require approval of governmental authorities having jurisdiction thereover. Waller County shall exercise its rights of review and approval hereunder with due diligence, reasonableness, and good faith. The County shall use its reasonable efforts to expedite any required review of the Project or other matters by any governmental authority.

4.8 Site Access: Prior to the Transfer Date, the County and the Contractor shall have uninterrupted access to the construction site. Subsequent to the Transfer Date, Waller County will permit the Contractor, the Design Engineer, and their representatives and subcontractors to enter upon the Project at times reasonably necessary to complete the punch list items.

4.9 Applicable Laws and Regulations: Contractor shall perform its obligations pursuant to this Contract in accordance with all applicable federal, state, and local statutes, ordinances laws, regulations, and executive, administrative and judicial orders. The Contractor may be entitled to an extension of time if changes in said applicable laws and regulations cause any delay in the performance of the Contractor's obligations under this Contract.

4.10 Environmental Regulations: Contractor shall plan and execute its operations in compliance with all applicable Federal, state, and local laws and regulations concerning control and abatement of water pollution and prevention and control of air pollution.

4.11 Material Safety Data Sheets: Contractor shall be responsible for providing and coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the site in accordance with laws and regulations.

4.12 Permits: Contractor shall obtain, possess, and pay for all permits, licenses, and fees required to complete the Project. The permits shall be in the name of Waller County.

4.13 Familiarity with Project: The Contractor represents and agrees that it is thoroughly familiar with all phases of the Project, all matters and conditions that may affect the construction

and successful completion of the Project, and had the opportunity to conduct any and all additional inquiry, tests, and investigations that it deemed necessary and proper. Contractor further certifies that it has: (a) visited and examined the construction site, the obstacles thereon, if any, and observed all conditions that may affect the Project (b) determined the nature and location of the Project, (c) understands the general and local conditions which affect the Project, and (d) investigated the labor and materials market as they are relevant to the Project. Contractor represents and agrees that it is able to successfully complete the Project for the Contract Price.

4.14 Contractor: Contractor specifically represents that is 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 or she deems necessary and proper. The Contractor acknowledges the receipt of the geotechnical report, if any, and agrees that the report, while it is an accurate record of the geotechnical conditions at the boring locations, is not a guarantee of specific site conditions which may vary between boring locations.

4.15 Duty to Notify of Unforeseen Conditions: The Contractor must notify the County 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 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 the County conducts an investigation. The Authorized Representative and the Design Engineer will promptly investigate such conditions. If it is determined that such conditions differ materially and cause an increase or decrease in the Contractor's cost of or time required for performance of any part of the Work, the Authorized Representative will recommend an equitable adjustment in the Contract Price, Contract Time, or both. If it determined that such conditions are not materially different from those indicated in the Contract Documents, the Authorized Representative will notify the Contractor in writing of such findings, and the Contract will not be adjusted.

4.16 Contractor's General Warranty: The Contractor warrants and guarantees to the County that all work performed on the Project will conform to the Contract Documents, be performed in a good and workmanlike manner in accordance with the Contract Documents, and will not be defective. The Contractor shall promptly correct defective work and damage that results from the Contractor's failure to exercise reasonable care in performing the Work, or from the Contractor's failure to perform the Work in a good and workmanlike manner. The Contractor shall use qualified, careful, and efficient contractors, subcontractors, employees, and workers in conformity with the provisions of this Contract. This Section 4.16 shall survive the termination or expiration of the Contract.

4.17 Contractor's Guarantee: The Contractor warrants and guarantees to the County that: (a) the Contractor possesses the skill and knowledge ordinarily possessed by well-informed members of its trade or profession, (b) the Contractor will use its best efforts to ensure that the services provided under this Contract are performed, delivered, and conducted in accordance with the best professional standards and in accordance with industry standards, and (c) the Contractor is fully experienced and properly qualified, equipped, organized and

financed to successfully complete the Project. The services and materials provided by the Contractor to Waller County will conform to the representations contained in this Contract, including all attachments, schedules, and exhibits.

4.18 No Limitation on Implied Warranties: The Contractor shall not limit or exclude any implied warranties, and shall extend such warranties for the goods or services provided under this Contract.

4.19 Work Performed Contrary to Law or Regulations: If Contractor performs any Work knowing or having reason to know that it is contrary to laws or regulations, the Contractor shall bear all claims, costs, losses, and damages arising therefrom.

4.20 Warranties and Guarantees Cumulative: The Contractor's warranties and guarantees shall be cumulative, deemed consistent and not in conflict, are intended to be given full force and effect, and are to be interpreted expansively to give the County the broadest warranty protection. The 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:

a. Observations by County or the Design Engineer, or any of their officials, officers, representatives, employees, or agents;

b. Recommendation of any payment by County, or any of its officials, officers, representatives, employees, or agents;

c. The issuance of a certificate of Substantial Completion or any payment by the County to the Contractor under the Contract Documents;

d. Use or occupancy of the Project or any part thereof by the County or the public;

e. Any acceptance by the County, or failure to do so;

f. Any review of a Shop Drawing or sample submittal;

g. Any inspection, test, or approval by other; or

h. Any correction by the County of defective work.

4.21 Contractor's Personnel. Contractor shall maintain a work force adequate to accomplish the Work within the Contract Time. Contractor shall employ only competent, orderly, personnel for the Project that are skilled in the performance of the type of Work required under this Contract.

4.22 Contractor's Supervision: 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. The 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 complies accurately with the Contract Documents.

4.23 Contractor's Superintendent: Beginning on the execution of the Contract, and continuing until Final Completion, the Contractor shall identify and maintain a competent and

qualified superintendent who shall be authorized to act on behalf of the Contractor and with whom Waller County may consult at all reasonable times. The superintendent must be an employee of the Contractor, unless such requirement is waived in writing by the Authorized Representative. The superintendent shall not be transferred from the Project without the County's consent, which shall not be unreasonably withheld or delayed. Notwithstanding the foregoing, the superintendent is not required to be assigned solely to the Project, and shall be entitled to spend reasonable time working on matters unrelated to the Project, so long as such work on other matters does not render the superintendent unavailable to the Project or to Waller County. If the superintendent is transferred from the Project, Waller County shall have the right to approve the replacement superintendent. The County's approval shall not be unreasonably withheld or delayed. The Contractor shall replace the superintendent upon the County's request in the event that the superintendent is unable to perform to the County's satisfaction.

4.24 Effect of Obligation: The obligation to maintain the superintendent and work force shall not be construed to: (a) preclude the promotion of any of Contractor's employees assigned to the Project, or (b) give rise to any liability of the Contractor in the event an employee assigned to the Project leaves the Contractor's employment, or (c) imply that the County has an employer/employee relationship with Contractor, or any of its employees .

4.25 Wages: Contractor shall pay workers on the Project in accordance with Section 15, and not less than the wage rates, including fringe benefits, as published by the Department of Labor for Building Construction and Heavy and Highway Trades, as applicable.

4.26 Subcontractors: The Contractor shall not employ any Subcontractor, Supplier, or other person or organization, whether initially or as a substitute, against whom the County may have a reasonable objection. Contractor shall not substitute any Subcontractor, person, or organization that has been accepted by the County, unless the substitute has been accepted in writing by the County. No acceptance by the County of any Subcontractor, Supplier, or other person or organization shall constitute a waiver of any right of the County to reject defective work. Contractor shall provide County with a complete list of any Subcontractors it intends to use on the Project. In the event that Subcontractors are used on the Project, the Subcontractor must agree to be bound by the terms of this Contract.

4.27 Responsibility for Subcontractors: The Contractor shall be fully responsible to the County for all acts and omissions of the Subcontractors, 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 the Contractor's own acts and omissions. Nothing in the Contract Documents shall create for the benefit of any such Subcontractor, Supplier, or other person or organization any contractual relationship between the County and any such Subcontractor, Supplier, or other person or organization, nor shall it create any obligation on the part of the County to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other person or organization except as may otherwise be required by laws and regulations.

4.28 Construction Site Order: The Contractor shall at all times maintain good discipline and order on the construction site. If Contractor becomes aware that any employee, subcontractor, or subcontractor's employee is incompetent, disorderly, abusive, disobedient, has knowingly violated safety regulations, has possessed any firearm in

contravention of applicable Texas law, has possessed or was under the influence of alcohol or drugs on the job, or has violated any federal, state, or local law, rule, or ordinance. Contractor shall immediately remove such worker or representative, including an officer or owner of Contractor or any Subcontractor from performing work on the Project, and may not subsequently allow such worker or representative at the construction site without the County's written consent. Contractor, the Design Engineer, Subcontractors, and workers or employees shall comply with all applicable health, safety, and loss prevention rules of applicable governmental authorities. The Contractor shall at all times enforce strict discipline and good order among its employees and workers, and shall not employ on the Project any unfit person or anyone not skilled in the work assigned to him. Waller County may, upon thirty (30) days written notice to the Contractor and without cause, require the removal of any individual from performing work on the Project.

4.29 Construction Site Conditions: Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the site and land and areas identified by the Designated Representative, and other land and areas permitted by laws and regulations, right-of-way, permits, and easements. Contractor shall not unreasonably encumber the premises with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas, resulting from the performance of the Work. During the progress of the Work, and on a daily basis, Contractor shall keep the premises free from accumulations of waste materials, rubbish, and other debris resulting from the Work. 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 leave the site clean and ready for use by County at Substantial Completion of the Work. Contractor shall restore to original condition all property not designated for alteration by the Contract Documents. If the Contractor fails to clean up at the completion of the Work, the County may do so, and charge the cost thereof to the Contractor.

4.30 Inspection: The Project and all parts thereof shall be subject to inspection from time to time by inspectors designated by Waller County. No such inspections shall relieve the Contractor of any of its obligations hereunder. Neither failure to inspect, nor failure to discover defects or reject any of the work as not in accordance with the Contract Documents shall be construed to imply an acceptance of such work or to relieve the Contractor of any of its obligations hereunder. Waller County agrees that its right of inspection shall be used reasonably and in a timely manner so as not to delay orderly completion of the Project.

4.31 Safety: The Contractor shall be responsible for initiating, maintain, and supervising all safety precautions and programs in connection with performing work on the Project. The Contractor shall comply with all applicable laws and regulations of any public body having jurisdiction for the 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. The Contractor shall comply with all federal, state, and local occupational hazard and safety standards, codes and regulations applicable in the jurisdiction where the Project is located. The Contractor shall include the substance of this clause in its entirety in all subcontracts for any work to be performed at the construction site.

4.32 Responsibility for Property: Contractor shall notify owners of adjacent property and of underground facilities, and utility owners when performance of work on the Project 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 materials or equipment used in furtherance of the Project, whether stored on or off site, and to any other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and underground facilities not designated for removal, relocation, or replacement in the course of construction that is caused, directly or indirectly, in whole or in part, by the Contractor, Subcontractor, or any personal or entity directly or indirectly employed by them shall be remedied by Contractor. Contractor is solely responsible for the location and protection of any and all public utility lines and utility customer service lines in the Work area. "Public utility lines" means the utility distribution and supply system, and "utility customer service lines" means the utility lines connecting customers to the utility distribution and collection system. Generally, existing utility customer service line connections are not shown on the Drawings. The Contractor shall exercise due care to locate, mark, uncover, and otherwise protect all such lines in the construction zone and any of Contractor's work or storage areas, and to notify appropriate authorities of relevant activity in the construction zone. Contractor's responsibility for the location and protection of utilities is primary and nondelegable.

4.33 Protection Against Risks: The Contractor shall take all necessary and adequate precautions to protect against conditions created during the progress of the Project which involve a risk of bodily harm or death to persons, or a risk of damage or loss to any property. The Contractor shall regularly inspect all work, materials, and equipment to discover and determine any such conditions, and shall be responsible for discovery, determination, and correction of any such conditions.

4.34 Hazardous Materials: Contractor shall be responsible for any hazardous materials brought to the site by the Contractor, Subcontractor, Suppliers, or anyone else for whom Contract is responsible, and shall be responsible for the use, storage, and remediation of any such hazardous materials. The Contractor shall immediately notify the County of any hazardous material uncovered or revealed at the Construction Site which was not shown, indicated, or identified in the Contract Documents to be within the scope of the Work and which may present a substantial danger to persons or property exposed thereto in connection with the Work at the site. The Contractor shall immediately notify the Authorized Representative of any suspected hazardous materials encountered before or during the performance of the Work, and shall take all necessary precautions to avoid further disturbance of the materials.

4.35 Contractor's Duties Continue Until Final Acceptance: Contractor's duties and responsibilities for safety and protection of the Work and property shall continue until such time as the Project is completed, and the County has issued a written notice indicating final acceptance of the completed Project.

4.36 No Excessive Loading: Contractor shall no load, nor permit any part of any structure to be loaded in any manner that will endanger the structure. The Contractor shall not subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

4.37 Texas Department of Transportation: the Contractor shall perform the Work in accordance with any applicable rules, regulations, and standards adopted by the Texas Department of Transportation.

4.38 Meetings and Cooperation: Contractor shall meet with the County or its Authorized Representative on an as needed basis to ensure the Work is performed satisfactorily. The Contractor shall cooperate at all times with the County, and other contractors providing services to the County to maintain maximum security and efficiency.

4.39 Equipment and Materials: Except as expressly provided otherwise, the Contractor shall furnish and pay for all construction, transportation, installation, materials, labor, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and any other equipment, facilities, and incidentals required for the furnishing, performance, testing, start-up, and completion of the Project within the time specified, except for professional services as defined by Texas Government Code Chapter 2254. Such equipment and facilities shall be of good quality and new (including new products made of recycled materials, pursuant to Texas Health and Safety Code § 361.426), and fit for the uses intended. Defective items shall be removed from the construction site promptly and at the Contractor's expense. If requested by the Authorized Representative, Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment used for the Project. All materials and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, unless otherwise provided in the Contract Documents. Any Supplier or manufacturer furnishing these items shall be experienced in the design and construction of such materials, and shall be an established supplier of the items and materials. The Contractor shall schedule its other operations so as not to interfere with its duty to timely furnish the necessary equipment, materials facilities, and personnel to operate the same at the times necessary for the orderly and timely completion of the Project. Title to materials delivered to the Construction Site or a staging area will pass to the County upon delivery without the necessity for further documentation. Risk of loss will not pass to the County until Final Acceptance.

4.40 Defective Work: The County and the Design Engineer may disapprove or reject Work with either believes to be defective, or believes will not produce a completed Project that conforms to the Contract Documents, or will jeopardize the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. The Contract shall bear all losses, damages, costs, and claims related to remedying defective work.

4.41 Uncovering Work: The Contractor shall uncover the Work in the following circumstances:

a. If any Work, including the work of Subcontractors or others, that is to be inspected, tested, or approved is covered by the Contractor or Subcontractor without written concurrence of the Authorized Representative, or if any Work is covered contrary to the written request of the Authorized Representative, it must, if requested by the Authorized Representative, be uncovered and recovered at the Contractor’s expense.

b. If the Authorized Representative considers it necessary or advisable that covered Work be observed, inspected, or tested, the Contractor shall uncover, expose, or

otherwise mark 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, the Contractor shall pay all claims, costs, losses, and damages caused by, arising out of, or resulting from such uncovering, exposure, observation, inspection, and testing and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and the County shall be entitled to an appropriate decrease in the Contract Amount, and may make claim therefore. If such Work is not found to be defective, the Contractor may be allowed an increase in the Contract Price, or an extension of the Contract Time, or both, which is directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction.

4.42 Contractor's Remedy for Delay, Disruption, or Hindrance. Contractor and County contemplate that Contractor's performance may be delayed, disrupted, or interfered with by unanticipated causes including but not limited to the following:

a. Severe and unavoidable natural disasters such as fires, floods, epidemics and earthquakes;

b. Abnormal weather conditions;

c. Acts or failures to act of the County, third party utility owners, or other third party entities; and

d. Acts of war or terrorism.

Contractor and the County agree Contractor's sole remedy for delays in performance of the Work, whether or not such delays are foreseeable, is an extension of the Contract Time, except as provided in Section 4.43. Contractor shall receive no compensation or damages of any kind for delays, disruptions, or hindrances to the Work. The County's exercise of any of its rights or remedies under the Contract 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 County's exercise of such rights or remedies, shall not be construed as intentional interference with Contractor's performance of the Work. The sole remedy of Contractor for any delay, disruption, or hindrance caused by the County's exercise of any of its rights or remedies under the Contract Documents shall be strictly limited to an extension of the Contract Time, except as expressly provided in Section 4.43.

In no event shall the Contractor be entitled to any compensation or recovery of any special damages in connection with any delays, disruptions, or hindrances, including without limitation: consequential damages, lost opportunity costs, impact damages, indirect damages, exemplary damages, compensation for unjust enrichment, attorney's fees or other similar damages or costs.

4.43 Direct and Unavoidable Costs: In the event the County is the sole cause of a delay, disruption, or hindrance by acts or omissions that constitute fraud, intentional misrepresentation, gross negligence, or intentional interference with Contractor's performance of the Work, Contractor may receive compensation for direct and unavoidable

extra costs only to the extent such acts continue after Contractor notifies the County in writing of such conduct. The direct and unavoidable costs must be specifically proved, and caused solely by the proven wrong. When such extra compensation is claimed, a written statement thereof shall be presented by Contractor to the County, and if found by the County to be correct, shall be approved.

4.44 No Authority to Act of Behalf of County: The Contractor agrees and understands that neither it, nor any of its agents, employees, or Subcontractors may act in the name of the County unless specifically authorized in writing by the County.

SECTION 5. PREVAILING WAGES

5.1 See Attachment A. Prevailing Wages

SECTION 6. PAYMENT

6.1 Payment: Waller County shall pay the Contractor according to the contract in current funds for the Contractor's performance, as stated herein, after issuance of a Notice to Proceed and a purchase order issued by the Waller County Procurement Director. In no event will Contractor be paid the entire contract price prior to beginning work, or prior to completion of the work.

6.2 Retainage: The County shall withhold a ten percent (10%) retainage from each Application for Payment, which shall be paid subject to Sections 6.6 and 6.7.

6.3 Applications for Payment: Waller County shall make progress payments to the Contractor as provided below.

a. The Contractor shall submit Applications for Payment to the Waller County Treasurer's Office, 836 Austin Street, Suite 2200, Hempstead, Texas 77445 in a form acceptable to the County. Each Application for Payment must be filled out and signed by the Contractor, and cover the Work that is completed as of the date of the Application and be accompanied by sufficient supporting documentation.

b. With each Application for Payment, the Contractor must submit an affidavit certifying that Contractor has paid in full any bills submitted to the Contractor for labor, material and expendable equipment that Contractor used in the performance of Work or the provision of services under the Contract. The certifying affidavit must be provided to the County before the applicable Application for Payment will be approved for payment.

c. Applications for Payment shall not include requests for payment related to changes in the Work which have not been authorized through a Change Order.

d. Applications for Payment shall not include requests for payment of amounts that the Contractor does not intend to pay to a Subcontractor or Supplier because of a dispute or other reason.

e. The period covered by each Application for Payment shall be one calendar month beginning on the first day of the month, and ending on the last day of the month. A complete and accurate Application for Payment must be submitted to the County Treasurer not later than the 15th day of the month following the month in which the work was performed.

f. The Application for Payment shall indicate the percentage of completion of each portion of the Project as of the end of the period covered by the application for payment.

g. Subject to the provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

   i. Take that portion of the contract sum properly allocable to the completed Project less retainage of ten percent (10%).

   ii. Add that portion of the contract sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved by Waller County, suitably stored off the site at a location agreed upon in writing), less retainage of ten percent (10%).

   iii. Subtract the aggregate of previous payments made by Waller County.

h. Payment will be made by the County in accordance with Texas Government Code, Chapter 2251.

6.4 Final Payment: If, upon Final Completion and 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, the Authorized Representative is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, there are no outstanding claims, and punch list items have been completed, the Authorized Representative will recommend the final Application for Payment for approval to the Waller County Commissioners Court. Final payment shall constitute the entire unpaid, undisputed balance of the Contract Price. The Contractor may make application for final payment following the procedure for progress payments after the Contractor has complied with the requirements of Section 6.3 to the County's satisfaction, and delivered the following documents:

a. Affidavit by Contractor certifying the payment of all debts and claims;

b. The Record Documents identified in Section 13;

c. Consent to surety, if any, to final payment. If surety is not provided, complete and legally effective releases or waivers that are satisfactory to the County of all claims arising out of or filed in connection with the Work;

d. Certificate evidencing that any applicable requirement for insurance will remain in force after final payment and through the warranty period;

e. Proof of performance bond extension through warranty period, if a performance bond was required; and

f. Any other documentation called for in the Contract Documents.

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

6.5 Review of Applications for Payment and Payment: The Authorized 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 processing by the County, or return the Application to the Contractor indicating the Authorized Representative's reasons for not recommending payment. If the Authorized Representative does not recommend payment, the Contractor shall make the necessary corrections and resubmit the Application.

a. By recommending payment, the Authorized Representative does not represent that:

i. Exhaustive or continuous on-site inspections have been made to check the quality or quantity of the Work;

ii. Examination has been made to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Price; or

iii. Contractor's construction means, methods, techniques, sequences, or procedures have been reviewed.

6.6 County's Right to Withhold Payment: The County may withhold or nullify the whole or part of any payment to such extent as the County deems necessary in the event that:

a. Defective work is not remedied as required by the County and in the time frame required by the County;

b. A third party files a claim or there is reasonable evidence indicating probable filing of such claims;

c. Contractor fails to make payments properly to Subcontractors for labor, materials, or equipment;

d. There is reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Amount;

e. There is damage to the County or another contractor;

f. There is reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;

g. The Contractor fails to submit a schedule of values in accordance with the Contract Documents;

h. The Contractor fails to maintain a record of changes on drawings and documents;

i. The Contractor fails to maintain weekly payroll reports and, as applicable, provide copies of reports in a timely manner upon request of the County;

j. The Contractor fails to submit monthly subcontractor reports;

k. Contractor neglects or unsatisfactorily prosecutes of the Work, including fails to clean up; or

l. The Contractor fails to comply with any provision of the Contract Documents.

6.7 Reason for Withholding Payment Removed: When the above reasons for withholding payment are removed, the Contractor shall resubmit an Application for Payment for the value of the Work performed. Payment will be made in accordance with Texas Government Code Chapter 2251.

6.8 Payment to Subcontractors when Payment Withheld: Subcontractors may request Partial Payment when the County withholds payment of an invoice to the Contractor for any reason listed in Section 6.6. If the payment is withheld by the County, the Contractor shall notify all affected Subcontractors within two (2) working days of notice that payment is being withheld. Upon notification, Subcontractors may submit a formal written request for Partial Payment to the Contractor and the County. If directed by the County, the Contractor shall within three (3) working days resubmit to the County an invoice for the same period that includes only work performed by the requesting Subcontractors during this period. The County will review this resubmitted invoice. Upon receipt of payment for the resubmitted invoice, the Contractor shall pay the Subcontractor within ten (10) calendar days.

SECTION 7. COMPLETION, TRANSER, AND ACCEPTANCE

7.1 Substantial Completion: When the Contractor considers that the Work, or a portion thereof which the County agrees to accept separately, is substantially complete, the Contractor shall notify the Authorized Representative, and request a determination as to whether the Work, or a designated portion thereof is substantially complete. If the Authorized Representative does not consider the Work to be substantially complete, the Authorized Representative will notify Contractor in writing, and give the reasons therefor. If Owner's Representative considers the Work to be substantially complete, the Authorized 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, and shall establish the time within which the Contractor shall finish the punch list. Failure to include an item on the punch list does not alter the Contractor's responsibility to complete all Work in accordance with the Contract Documents. If an inspection is required by public authorities having jurisdiction over the Work, such inspection must be made and passed before the Work, or any portion thereof will be considered substantially complete.

7.2 Final Inspection: Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, the County will make a final inspection with Contractor, and provide written notice of all the particulars in which 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.

7.3 Punch List: Upon the occurrence of Substantial Completion, the punch list items shall be promptly commenced and thereafter completed within thirty (30) days after final completion.

SECTION 8. TERM, SUSPENTION OF WORK, AND TERMINATION

8.1 Agreement Term: The term of this Agreement shall begin on the date of execution, and shall continue until the complete performance of the terms and conditions of this Contract by the parties unless either party terminates this Contract in accordance with its terms.

8.2 Suspension by County for Convenience: The County may, in its sole discretion and without

cause, order the Contractor in writing to suspend or interrupt the Project in whole or in part for such period of time as the County may determine. In the event the County suspends or interrupts the Work, an adjustment may be made to account for any change in the actual cost of performance of the Work caused by the suspension, or interruption. No adjustment shall be made for an increase in the Contract Price if the performance of the work is, was, or would have been so suspended, delayed, or interrupted by another cause for which the Contractor is responsible, or when an equitable adjustment is made or denied under another provision of this Contract.

8.3 Automatic Termination: This Agreement shall automatically terminate upon complete performance of the terms and conditions of the Agreement by each Party, or otherwise in accordance with its terms.

8.4 Termination for Insolvency and Bankruptcy: The County, in its sole discretion, may immediately terminate this Agreement without notice or the opportunity to cure if Contractor becomes insolvent or files any petition for bankruptcy.

8.5 Termination for Cause: Upon seven (7) calendar days' notice to Contractor, the County may terminate the Contract for cause if the Contractor:

a. Persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

b. Fails to make payment to Subcontractors for materials or labor in accordance with respective agreements between the Contractor and the Subcontractor;

c. Disregards laws, ordinances, rules, regulations, or orders of public authority having jurisdiction concerning the Project: or

d. Otherwise commits substantial breach of a provision of the Contract Documents.

8.6 Termination for Convenience: Upon seven (7) calendar days' written notice to Contractor, the County may, in its sole discretion and without penalty or prejudice to any right or remedy of County, terminate this Contract for convenience and without cause at any time. The written notice must be provided in accordance with Section 18.19. The notice must state the reasons for such termination, and provide an effective date of the termination. The notice may also contain instructions necessary to protect, store, or decommission any incomplete work or systems, and/or for safety. Upon receipt of such notice, Contractor shall immediately proceed with the following obligations regardless of whether a dispute regarding the Contract exists:

a. Stop all work;

b. Comply with any instructions contained in the termination notice;

c. Place no further subcontracts or order for materials or services;

d. Terminate all subcontracts for convenience;

e. Cancel all materials and equipment orders as applicable; and

f. Take appropriate action to protect and preserve all property related to the Contract which is in the possession of Contractor.

8.7 Notice of Termination: The terminating Party shall provide seven (7) days written notice

of termination to the other Party as provided in Section 18.19.

8.8 Discretionary Opportunity to Cure: A Party receiving notice of termination for failure to perform in accordance with the terms of this Agreement shall have the opportunity to cure its failure to perform beginning on the day of its receipt of the written notice, and continuing for thirty (30) calendar days thereafter. The cure, if made, shall be to the terminating Party's satisfaction. If no cure is made, the Agreement will terminate on the date specified in the written termination notice, or if no date is specified, on the thirtieth (30^{th}) calendar day after the date of receipt of the notice, unless otherwise agreed by the Parties.

8.9 County's Rights After Termination: In the event of termination, the County may immediately take possession of the site, and of all materials, equipment, tools, and construction equipment and machinery thereon. The County may finish the Project by whatever reasonable method it deems expedient.

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

8.11 Responsibility During Demobilization: While demobilizing, the Contractor shall take all necessary and reasonable actions to preserve and protect the Work, the site, and other property of the County or others at the site.

8.12 Payment After Termination: In the event the County terminates the Contract, the County shall pay the Contractor only for work performed prior to the date of termination, and that is satisfactory to County. Contractor shall not be entitled to lost or anticipated profits should the County choose to exercise its option to terminate. Not later than 30 days after the date of termination, the Contractor shall submit to County a final termination settlement proposal to the County for Work already performed. It any of the Work contained in the settlement proposal is not satisfactory to the County, the County shall provide written notice to the Contractor. The County shall only pay for the portion of the Work that it determines in good faith to be satisfactory. If Contractor fails to submit the settlement proposal within the time specified, the County may unilaterally determine the amount owed to Contractor. Payment of the amount determined by the County shall be full satisfaction of any claim or debt due by County to Contractor under the Contract.

SECTION 9. RIGHT TO ASSURANCE

9.1 Right to Assurance: In the event that the county has a reason to question the Contractor's intent or ability to perform its obligations under the Contract, the County may demand that the Contractor give written assurance of its intent to perform, its plan to properly continue performance, and a detailed timeline for completion of the Project. The Contractor shall provide a written response to County that addresses the County's demand for written assurance within five (5) business days. If Contractor fails to provide the written response, the County may treat the failure as an anticipatory repudiation of the Contract.

SECTION 10. INSURANCE

10.1 Insurance Coverages: Contractor shall carry insurance in the types and amounts indicated below, which shall include items owned by the County in the care, custody, and control of the Contractor prior to and during construction and warranty period. It is intended that

policies required by this Contract covering both the County and the Contractor shall be considered primary coverages as applicable. Contractor shall provide the County with certificates of insurance evidencing compliance with the requirements of this Section. The certificates shall indicate the name of the Contractor, the name of the insurance company, the policy number, and the term and limits of coverage. The insurance coverage must be with a company having Best's rating of A/VII or better, authorized to do business in the State of Texas at the time the policies are issued and in force, and shall be of the following types and limits:

a. Workers Compensation insurance in accordance with applicable law. Substitutes to genuine Workers' Compensation Insurance will not be allowed.

b. Employers' Liability insurance with limits of not less than $1,000,000 per injury by accident, $1,000,000 per injury by disease, and $1,000,000 per bodily injury by disease.

c. Comprehensive general liability insurance with a limit of not less than $1,000,000 each occurrence and $2,000,000 in the annual aggregate. Policy shall cover liability for bodily injury, personal injury, and property damage and products/completed operations arising out of the business operations of the policy holder.

d. Business Automobile Liability coverage for owned, non-owned, and hired vehicles, with a combined Bodily Injury/Property Damage with minimum limits of not less than $1,000,000 each accident. The policy shall cover liability arising from the operation of licensed vehicles by policyholder.

e. Builder's Risk Insurance or Installation Insurance on an all risk physical loss form in the Contract Amount. Coverage shall continue until the Work is accepted by the County. The County shall be a loss payee on the policy. If off-site storage is permitted, coverage shall include transit and storage in an amount sufficient to protect property being transported or stored.

10.2 Additional Insured: Contractor's insurance policies that cover performance under this Contract shall name the County an additional insured, except for Workers' Compensation and Professional Liability, if required. All endorsements naming the County as additional insured, waivers, and notices of cancellation of endorsements, as well as the Certificates of Insurance shall indicate: Waller County, Texas, 836 Austin Street, Suite 4300, Hempstead, Texas 77445.

10.3 Certificates of Insurance: Contractor shall provide the County with properly executed certificates of such insurance before the Contract is executed as verification of the coverage required in Section 10.1. The certificates shall indicate that all required insurance coverages are effective as of the Effective Date, and that such insurance shall not be canceled, except on thirty (30) days prior written notice to the County. The Contract shall not commence Work until the required insurance is obtained and until such insurance has been reviewed by the County. The Contractor must also provide Certificates of Insurance when a previously identified policy period has expired as verification of continuing coverage.

10.4 Certified Copies of Insurance Policies: The Contractor shall provide the County with

certified copies of the required insurance policies and endorsements thereto upon request and without expense to the County.

10.5 Responsibility for Insurance: The Contractor shall be responsible for premiums, deductibles, and self-insured retentions, if any, state in the policies. All deductibles or self-insurance retentions shall be disclosed on the Certificates of Insurance.

10.6 No Decrease in Liability: The County's acceptance or approval of the certificates of insurance or certified copies of insurance policies shall not relieve, decrease, or limit Contractor's liability. The insurance coverages required under this Contract are required minimum and are not intended to limit the responsibility of liability of the Contractor.

10.7 No Cancellation or Modification: The Contractor shall continuously maintain the required insurance coverages during the Contract Term. Contractor shall not cancel or modify the insurance coverages required by this Agreement without providing thirty (30) days written notice to the County. Contractor shall not allow a lapse in the insurance coverage specified in this Contract for the duration of the Contract.

10.8 Workers Compensation Certification: By signing this Contract or providing or causing to be provided a certificate of coverage, the Contractor is representing to the County that all employees of the Contractor who will provided 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 self-insured, with the Texas Worker's Compensation Commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject Contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions.

10.9 County Occupancy: All insurance shall provide for the County to take occupancy of the Work or any part thereof during the term of said insurance.

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

SECTION 11. BONDS

11.1 Bonds Required: The Contractor must furnish the County with both a Performance Bond and a Payment Bond. Bonds shall be executed on forms acceptable to the County. Performance Bonds and Payment Bonds must 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 of Contractor's obligations under the Contract Documents. Performance Bonds and Payment Bonds shall be issued by a solvent surety company duly authorized to do business in the State of Texas, and licensed in the State of Texas to issue surety bonds with a Best Rating of A/VII or better, and shall meet any other requirements established by law or by the County pursuant to applicable law.

11.2 Surety Acceptable to County: The surety company must be acceptable to the County. If the County rejects the Contractor's proposed surety company, the Contractor must obtain the required bonds from a surety acceptable to the County within five (5) days of the County's rejection.

11.3 Extension Through Warranty Period: The required Performance Bond must extend through any applicable warranty period.

11.4 Bond Signed by Agent: All bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.

11.5 Surety Declares Bankruptcy: If the surety on any bond furnished by the Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in the State of Texas, or it ceases to meet the requirements of the preceding paragraph, Contractor shall within ten (10) days thereafter substitute another bond and surety, both of which must be acceptable to the County.

SECTION 12. INDEMNIFICATION

12.1 **INDEMNITY FOR BODILY INJURY OR DEATH CLAIMS: TO THE FULLEST EXTENT PERMITTING BY LAW, CONTRACTOR SHALL INDEMNIFY, DEFEND, AND HOLD HARMLESS THE COUNTY AND ITS OFFICERS, DIRECTORS, CONTRACTORS, EMPLOYEES, REPRESENTATIVES, AND AGENTS FROM AND AGAINST ALL CLAIMS, LOSSES, EXPENSES, COSTS, DEMANDS, SUITS, CAUSES OF ACTION, AND DAMAGES, INCLUDING WITHOUT LIMITATION, ATTORNEYS' FEES AND EXPENSES, FOR BODILY INJURY OR DEATH OF ANY EMPLOYEE OF CONTRACTOR, ITS AGENTS, OR ITS SUBCONTRACTORS OF EVERY TIER, EVEN IF THE BODILY INJURY OR DEATH IS CAUSED BY OR ALLEDGED TO HAVE BEEN CAUSED BY THE SOLE OR PARTIAL NEGLIGENCE, FAULT, OR STRICT LIABILITY OF ANY INDEMNITEE**

12.2 **GENERAL INDEMNITY: CONTRACTOR, ITS OFFICERS, DIRECTORS, PARTNERS, CONTRACTORS, EMPLOYEES, REPRESENTATIVES, AGENTS, SUCCESSORS, ASSIGNS, VENDORS, GRANTEES, AND/OR TRUSTEES (COLLECTIVELY REFERRED TO AS "CONTRACTOR" FOR PURPOSES OF THIS SECTION), AGREE TO RELEASE, DEFEND, INDEMNIFY, AND HOLD HARMLESS THE COUNTY AND ITS OFFICERS, OFFICIALS, DEPARTMENT HEADS, REPRESENTATIVES, AGENTS, AND EMPLOYEES (COLLECTIVELY REFERRED TO AS "COUNTY" FOR PUPOSES OF THIS SECTION) FROM ANY AND ALL CLAIMS, DEMANDS, DAMAGES, INJURIES – INCLUDING DEATH AND BODILY INJURY – LIABILITIES, AND EXPENSES (INCLUDING ATTORNEY'S FEES AND COSTS OF DEFENSE) ARISING DIRECTLY OUT OF OR RESULTING FROM THE OPERATION OR PERFORMANCE OF CONTRACTOR UNDER THIS AGREEMENT. THE COUNTY WILL NOT ACCEPT LIABILITY FOR INJURIES THAT ARE THE RESULT OF THE NEGLIGENCE, MALFEASANCE, ACTION, OR OMMISION OF CONTRACTOR. CONTRACTOR AGREES TO ACCEPT LIABILITY FOR INJURIES TO ITSELF OR OTHERS CAUSED BY ITS OWN NEGLIGENCE, MALFEASANCE, ACTION, OR OMMISSION. THIS INDEMNIFICATION PROVISION IS ALSO SPECIFICALLY INTENDED TO APPLY TO, BUT NOT BE LIMITED TO, ANY AND ALL CLAIMS, WHETHER CIVIL OR CRIMINAL, BROUGHT AGAINST COUNTY BY ANY GOVERNMENT AUTHORITY OR AGENCY RELATED TO ANY PERSON PROVIDING SERVICES UNDER THIS**

AGREEMENT THAT ARE BASED ON ANY FEDERAL IMMIGRATION LAW AND ANY AND ALL CLAIMS, DEMANDS, DAMAGES, ACTIONS, AND CAUSES OF ACTION OF EVERY KIND AND NATURE, KNOWN AND UNKNOWN, EXISTING OR CLAIMED TO EXIST, RELATING TO OR ARISING OUT OF ANY EMPLOYMENT RELATIONSHIP BETWEEN CONTRACTOR AND ITS EMPLOYEES OR SUBCONTRACTORS AS A RESULT OF THAT SUBCONTRACTOR'S OR EMPLOYEE'S EMPLOYMENT AND/OR SEPARATION FROM EMPLOYMENT WITH THE CONTRACTOR, INCLUDING BUT NOT LIMITED TO ANY DISCRIMINATION CLAIM BASED ON SEX, SEXUAL ORIENTATION OR PREFERENCE, RACE, RELIGION, COLOR, NATIONAL ORIGIN, AGE OR DISABILITY UNDER FEDERAL, STATE OR LOCAL LAW, RULE OR REGULATION, AND/OR ANY CLAIM FOR WRONGFUL TERMINATION, BACK PAY, FUTURE WAGE LOSS, OVERTIME PAY, EMPLOYEE BENEFITS, INJURY SUBJECT TO RELIEF UNDER THE WORKERS' COMPENSATION ACT OR WOULD BE SUBJECT TO RELIEF UNDER ANY POLICY FOR WORKERS COMPENSATION INSURANCE, AND ANY OTHER CLAIM, WHETHER IN TORT, AGREEMENT, OR OTHERWISE.

COUNTY SHALL HAVE THE RIGHT TO APPROVE DEFENSE COUNSEL TO BE RETAINED BY CONTRACTOR IN FULFILLING ITS OBLIGATION TO DEFEND AND INDEMNIFY COUNTY HEREUNDER, UNLESS SUCH RIGHT IS EXPRESSLY WAIVED BY COUNTY IN WRITING. COUNTY RESERVES THE RIGHT TO PROVIDE A PORTION OR ALL OF ITS OWN DEFENSE; HOWEVER, COUNTY IS UNDER NO OBLIGATION TO DO SO. ANY SUCH ACTION BY COUNTY IS NOT TO BE CONSTRUED AS A WAIVER OF CONTRACTOR'S OBLIGATION TO DEFEND COUNTY OR AS A WAIVER OF CONTRACTOR'S OBLIGATION TO INDEMNIFY COUNTY PURSUANT TO THIS AGREEMENT. IF CONTRACTOR FAILS TO RETAIN COUNTY APPROVED DEFENSE COUNSEL WITHIN TEN (10) BUSINESS DAYS OF COUNTY'S WRITTEN NOTICE THAT COUNTY IS INVOKING ITS RIGHT TO INDEMNIFICATION UNDER THIS AGREEMENT, COUNTY SHALL HAVE THE RIGHT TO RETAIN DEFENSE COUNSEL ON ITS OWN BEHALF, AND CONTRACTOR SHALL BE LIABLE FOR ALL REASONABLE ATTORNEY FEES AND COSTS INCURRED BY COUNTY. CONTRACTOR AND COUNTY AGREE TO FURNISH TIMELY WRITTEN NOTICE TO EACH OTHER OF ANY SUCH CLAIM.

THIS SECTION SHALL SURVIVE THE TERMINATION OF THIS AGREEMENT.

SECTION 13. RECORDS AND AUDITS

13.1 Record Copy: Contractor shall maintain a record copy of all Drawings, Specifications, Addenda, Change Orders, and written interpretations and clarifications in good order and annotated to show all changes made during construction. These documents, together with all final samples and all final Shop Drawings shall be available to the County and the Design Engineer during performance of the Work. Upon Substantial Completion of the Work, these records and documents, samples, and Shop Drawings shall be promptly delivered to the Authorized Representative.

13.2 Document Ownership: The County shall be the absolute and unqualified owner of all drawings, preliminary layouts, record drawings, sketches, as-built drawings and other documents, including those identified in Section 13.1, prepared by the Contractor pursuant to this Contract. The Contractor shall deliver all such documents to the County prior to submitting the final Application for Payment. Neither the Contractor nor any Subcontractor shall reuse any such documents or copies on any other project without the written consent of both the County and the Design Engineer.

13.3 Record Preservation and Maintenance: The Contractor shall maintain and preserve accurate and complete records relating to the Project for a period of five (5) years measured from the expiration of the defects period, termination of this Contract, until all audit and litigation matters that the County has brought to the attention of the Contractor are resolved, or as otherwise required by law, whichever is longer. Upon request, the Contractor shall provide the County with such records. This Section 13.3 shall survive termination of the Contract.

13.4 Right to Inspect, Examine, Reproduce, and Audit: Waller County, and any of its duly authorized employees or agents, shall have the right to inspect, examine, reproduce, and audit the books and records of the Contractor generated by or on behalf of Contractor, whether paper, electronic, or other media, which are in any way related to performance of or compliance with this Contract, including, but not limited to:

a. Accounting records;

b. Written policies and procedures;

c. Subcontract files (including proposals of successful and unsuccessful bidders, and other related documents);

d. Original estimates and estimating work sheets;

e. Correspondence;

f. Change Order files;

g. Back charge logs and supporting documentation;

h. General ledger entries detailing cash and trade discounts earned, insurance rates, and dividends;

i. Lump sum agreements between Contractor and any Subcontractor or Supplier;

j. Records necessary to evaluate Contract compliance, Change Order pricing, and any Claim submitted by Contractor or any of its payees; and

k. Any other Contractor record that may substantiate any charge related to this Contract.

13.5 Survival of Terms: Waller County's right to inspect, examine, reproduce, and audit under this section for the same period of years that Contractor is required to maintain and preserve records under Section 13.3.

SECTION 14. SILENCE OF SPECIFICATIONS

14.1 Silence of Specifications: The apparent silence of specifications as to any detail, or the apparent omission of a detailed description concerning any point, shall be regarded as

meaning that only the best commercial practice is to prevail, and that only material and workmanship of the finest quality are to be used. All interpretations of specifications shall be made on the basis of this statement. The items furnished under this contract shall be new, unused of the latest product in production for commercial trade. The materials used and workmanship provided shall be of the highest quality.

SECTION 15. INDEPENDENT CONTRACTOR

15.1 Independent Contractor: The Contractor and its employees are independent contractors. Contractor shall exercise independent judgment in performing its duties under this Contract, and is solely responsible for setting working hours, scheduling or prioritizing its work flow, and determining how the work is to be performed. No term or provision of this Contract shall be construed as creating an employer/employee relationship, partnership, or a joint venture. Contractor agrees and understands that the Contract does not grant any rights or privileges established for employees of the County.

SECTION 16. LIMIT OF APPROPRIATIONS

16.1 Limit of Appropriations: Funds for payment of this Contract have been provided through the County budget approved by Commissioners Court for this fiscal year only. The State of Texas law prohibits the obligation and expenditure of public funds beyond the current fiscal year. The fiscal year for the County extends from January 1 of each calendar year until December 31 of the same calendar year. It is the expectation of the County that funding will be available to pay for the expenditures related to this Contract. Notwithstanding anything to the contrary in this Contract, if at any time during the term of this Contract the Commissioners Court of the County fails to provide funding for this Contract during the County's following fiscal year, does not adopt a budget for expenditures, or is only able to partially fund the expenditures required by this Contract, the County may, upon giving Contractor written notice of such failure, terminate this Contract, or a part hereof without any further liability to Contractor. Neither County, its elected officials, employees, agents, insurers, attorneys, nor any other individual acting on behalf of County may make any representation or warranty as to whether any appropriation will, from time to time, be made by the Waller County Commissioners Court. The failure of County to appropriate sufficient funds will not cause the County to be in default under this Agreement, and Contractor's sole and exclusive remedy shall be to terminate this Agreement. The County shall pay Contractor for any services already rendered under this Contract prior to the effective date of the termination.

SECTION 17. TEXAS REQUIRED CERTIFICATIONS

17.1 No Boycotting Israel: By signature affixed hereto, Contractor certifies that it does not currently boycott Israel, and will not boycott Israel during the term of this Contract.

17.2 Texas Comptroller's List of Prohibited Companies: By signature affixed hereto, Contractor certifies that it is not listed on the website of the Texas Comptroller concerning the listing of companies that are identified under Texas Government Code §§ 806.051, 807.051, or 2253.153.

17.3 No Energy Company Boycott: By signature affixed hereto, Contractor certifies that it does not currently boycott energy companies, and will not boycott energy companies during the term of this Contract.

17.4 No Discrimination Against Firearm and Ammunition Industries: By signature affixed hereto, Contractor certifies that it does not currently discriminate against firearm and ammunition industries, and that it will not during the term of this Contract.

SECTION 18. MISCELLANEOUS PROVISIONS

18.1 Jurisdiction and Venue: This Contract is made in and shall be construed according to the laws of the State of Texas, without regard to its conflict of laws provisions. Venue of any court action(s) brought directly or indirectly by reason of this Contract shall be in a court of competent jurisdiction in Waller County, Texas. This Contract is made and is to be performed in Waller County, Texas.

18.2 Right of Review: The County may review any and all of the goods and services performed by Contractor under this Agreement. The County is granted the right to audit, at the County's election, all of Contractor's records and billings related to the performance of this Contract as may be reasonably necessary. Any payment, settlement, satisfaction, or release made or provided during the course of performance of this Contract shall be subject to County's rights as may be disclosed by a review under this Section.

18.3 No Waiver: No claim or right arising out of a breach of this Contract can be discharged in whole or in part by a waiver or renunciation of the claim or right unless the waiver or renunciation is supported by consideration and is in writing signed by the aggrieved Party. The County's failure to require strict performance of any provision of this Contract does not waive or diminish the County's right thereafter to demand strict compliance with that or any other provision. The County's waiver or failure to exercise in any respect any right provided for in this Contract shall not be deemed a waiver of any further right under this Contract. The County does not waive, modify, or alter to any extent any of its defenses, immunities, or remedies.

18.4 No Personal Liability: Nothing herein shall be construed as creating any personal liability for any officer, agent, or employee of the County.

18.5 Severability: If any provision of this agreement is invalid, illegal, or unenforceable under any applicable statute, court decision, or rule of law, it is to that extent deemed to be omitted. In such event, there shall be substituted for such deleted provision a provision as similar as possible in terms and in effect to such deleted provision that is valid, legal, or enforceable. The remainder of the agreement shall be valid and enforceable to the maximum extent possible.

18.6 Entire Agreement: This Contract, together with all of its appendices, embodies the complete agreement of the Parties hereto, superseding all oral or written previous and contemporary agreements between the Parties and relating to matters in this Contract. By entering into this Contract, the Parties do not intend to create any obligations, express or implied, other than those specifically set out in this Contract.

18.7 Modification: The Contract may not be modified, altered, or amended except by written instrument duly authorized by the Waller County Commissioners Court and executed by both Parties.

18.8 Titles Not Restrictive: The titles assigned to the various sections and paragraphs of this Contract are for convenience only. Titles shall not be considered restrictive of the subject matter of any part of this Contract.

18.9 Tax Exempt: The County is a tax-exempt entity under Texas Tax Code § 151.039, and will not pay a tax from which it is exempt. Tax exempt paperwork will be provided upon written request for the purchase of any items qualifying for exemption under this Contract. In accordance with applicable laws and regulations, Contractor shall issue its Texas Resale Certificate to vendors and subcontractors for items that qualify for exemption. The Contractor shall be responsible for paying any and all taxes assessed, in whole or in part, on the Project or the Work. The County will not pay for, or reimburse Contractor for any tax from which it is exempt.

18.10 No Arbitration: A dispute arising under this Contract shall not be subject to arbitration.

18.11 Waiver of Subrogation: Contractor, Subcontractor's, and their insurance carriers waive any and all rights whatsoever with regard to subrogation against County as indirect parties to any suit arising out of personal or property damages resulting from Contractor's or Subcontractor's, or their employees' performance under this Contract.

18.12 Successors and Assigns: Waller County and the Contractor bind themselves, and their permitted successors executors, administrators, and assigns to this Contract. Neither Party shall assign, sublet, or transfer its interest, in whole or in part, in this Contract without the prior written consent of the other Party. The following conditions must be met before any permitted assignment becomes effective: a) Contractor must give written notice of a proposed assignment to the County at least thirty (30) days prior to the effective date of the assignment; b) the assignee must explicitly accept all of Contractor's obligations under this Contract; c) Contractor must retain its obligations to the County under this Contract until the assignment is effective; d) the assignment must be executed by both Contractor and the assignee; e) Contractor must provide the County a fully executed assignment agreement not later than five (5) business days after the assignment is signed, and f) the County provides a signed, written consent to the assignment.

18.13 Illegal Price Fixing: Contractor agrees to assign to the County any rights it may have to bring antitrust suits against its Suppliers for overcharges on materials incorporated in the Project growing out of illegal price fixing agreements. Contractor further agrees to cooperate with the County should the County which to prosecute suits against Suppliers for illegal price fixing.

18.14 Right to Offset: No money shall be paid by the County upon any claim, debt, demand, or account to any person, firm, corporation, or entity who owes taxes or any other debt to the County. The County shall be entitled to offset any such debt, claims, demand, or account by deducting the amount of taxes due to the County from any payment due to the Contractor. No assignment, or transfer of any such debt, claim, demand, or account after said taxes are due or other debt accrues shall affect the right of the County to so offset said taxes or other debt against the Contractor.

18.15 No Third-Party Beneficiaries: This Contract does not inure to the benefit of any third party, except permitted successor or assigns.

18.16 Authority to Sign: Signatories to this Contract represent and warrant that they have the authority to bind the respective parties.

18.17 Public Communications: Contractor shall not, under any circumstance, release any material or information developed in the performance of its services hereunder without the express

written permission of the County, except where required by law to do so. If required by law to release any material or information, Contractor shall notify the County before the release. County shall be solely responsible for communicating with and providing information to the news media, citizens of Waller County, and other governmental agencies.

18.18 Confidentiality: The County is bound by Texas Government Code Chapter 552, the Public Information Act, and other laws concerning government records. Contractor shall clearly and noticeably mark all confidential information and documents it provides to the County pursuant to this Contract. The County will make good faith efforts to promptly notify Contractor if any such information is requested in a public information request, subpoena, or other method so Contractor may argue against the release of such information. Contractor recognizes and understands that the final decision as to what information must be disclosed pursuant to the PIA lies with the Texas Attorney General. Contractor further agrees that the County may furnish information acquired through or pursuant to this Contract and that is requested through the PIA to the Texas Attorney General for a determination of whether the information must be disclosed. Neither the County, nor any of its officers, or employees shall have any liability or obligation to any party for the disclosure to the public, or to any person or persons, of any items or data furnished to the County by Contractor in reliance on any statute, court opinion, court order, or the advice, decision, or opinion of the Texas Attorney General.

18.19 Notices: Notices delivered hereunder shall be in writing and shall be delivered by personal delivery or certified mail, return receipt requested. Mailed notices shall be deemed received three (3) business days after the notice is placed in the mail with proper postage paid. Any notice or certification to be provided pursuant to this Agreement shall be delivered to the following persons, unless a substitute representative is designated in writing:

To the County	To Contractor:
Attn: County Judge 836 Austin Street, Suite 4300 Hempstead, Texas 77445	As indicated on Bidder's Business Information Sheet

With a copy to:

Waller County Road & Bridge Dept.
Attn: Ross McCall
775 Bus 290 East
Hempstead, Texas 77445

SECTION 19. FEDERAL CLAUSES

19.1 Refer to Attachment B. Federal Clauses

END

Contract Special Terms and Conditions

Bidder must clearly identify on this form whether it requests any Special Terms and Conditions that deviate from the Bid Documents, including the Contract Documents, or any other requirements contained in the IFB. Complete and detailed information regarding deviations must be clearly identified on this form. The County will consider any Special Terms and Conditions in its Contract award decision, and reserves the right to accept or reject a Bid based upon any submitted deviation.

In the absence of the identification on this form of requested deviations, Bidder must fully comply with the Bid Documents and Contract Documents and all other requirements associated with this IFB if awarded a Contract under this IFB. A deviation will not be effective unless it is accepted by the County. The County may, in its sole discretion, seek clarification from and/or communicate with Bidder(s) regarding any submitted deviation, consistent with general procurement principles of fair competition. The County reserves the right to accept or reject a Bid based upon any submitted deviation.

Please mark one of the following:

☐ Bidder requests NO deviations.

☐ Bidder requests deviations.

Specifically identify the language and location or section of the Bid Documents and/or Contract Documents that Bidder is requesting a deviation from, and provide the specific language to be substituted as Special Terms and Conditions. **Attach the sheet(s) containing the requested deviations to his form.**

Company Name	Date
Signature of Authorized Company Official	Printed Name

Contract Sheet

Contract Sheet
Bid 26-012

THE STATE OF TEXAS
COUNTY OF WALLER

This Contract is made and entered into on the _____ day of _____, 2025, by and between Waller County, Texas, a political subdivision of the State of Texas ("County"), acting through County Judge Carbett "Trey" Duhon, III by virtue of an order of Waller County Commissioners Court, and _____, of the City of _____, County of _____, and State of _____ ("Contractor") (referred to individually as "Party," and collectively as "Parties").

In consideration of the promises, performances, payments, and agreements set forth herein, Contractor hereby agrees to commence and complete the following Project: Prairie View Water Plant #2 Generator Project for Waller County, GLO Contract No. 24-065-016-E173, and all Work in accordance with the Contract Documents, which are incorporated herein by reference and made a part hereof for all purposes as if each were set out at length, word for word, and the County agrees to pay the Contractor the total amount of:

$	
(Figures)	(Words)

The Contractor hereby agrees to commence work on the date specified in the written Notice to Proceed to be issued by the County, and to finally complete construction of the improvements, as required by the Contract Documents within _____ calendar days. Waiver of any breach of this Contract shall not constitute waiver of any subsequent breach.

In consideration of the award and execution of this Contract, and in consideration of the waiver of its right to attorney's fees by the County, the Contractor knowingly and intentionally waives its right to attorney's fees under Texas Local Government Code Section 271.153 in any administrative proceeding, alternative dispute resolution proceeding, or litigation arising out of or connected to this Contract.

The County agrees to pay the Contractor from available funds for performance of the Contract in accordance with the Bind and provisions of the Contract Documents, subject to additions and deductions, as provided therein.

The County's payment obligations are payable only and solely from funds available for the purposes of this Contract.

It is further agreed that this contract shall not become binding or effective until signed by the parties hereto and a purchase order authorizing the items desired has been issued.

Although drafted by the County, the Contract, in the event of any disputes over its meaning or application, shall be interpreted fairly and reasonably, and neither more strongly for nor against either Party.

This Contract is executed to be effective upon the date of the last signature affixed hereto.

The undersigned, by their signature, represents that they are authorized to bind the Contractor to fully comply with the Contract. The Contractor, by signing below, acknowledges that they have read the entire Contract, and agree to be bound by the terms contained therein.

Approved this _____day of _____20_____.

Waller County, Texas

_____
County Judge, Carbett "Trey" Duhon, III

_____
Date

_____
By: Signature of Contractor

_____
Date

_____
Printed Name and Title of Signatory

ATTEST

_____
Debbie Hollan, County Clerk

Form **W-9**
(Rev. March 2024)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

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

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

Before you begin. For guidance related to the purpose of Form W-9, see *Purpose of Form*, below.

Print or type. See ***Specific Instructions*** on page 3.

1 Name of entity/individual. An entry is required. (For a sole proprietor or disregarded entity, enter the owner's name on line 1, and enter the business/disregarded entity's name on line 2.)

2 Business name/disregarded entity name, if different from above.

3a Check the appropriate box for federal tax classification of the entity/individual whose name is entered on line 1. Check only **one** of the following seven boxes.

☐ Individual/sole proprietor ☐ C corporation ☐ S corporation ☐ Partnership ☐ Trust/estate

☐ LLC. Enter the tax classification (C = C corporation, S = S corporation, P = Partnership) . . . . .

Note: Check the "LLC" box above and, in the entry space, enter the appropriate code (C, S, or P) for the tax classification of the LLC, unless it is a disregarded entity. A disregarded entity should instead check the appropriate box for the tax classification of its owner.

☐ Other (see instructions)

3b If on line 3a you checked "Partnership" or "Trust/estate," or checked "LLC" and entered "P" as its tax classification, and you are providing this form to a partnership, trust, or estate in which you have an ownership interest, check this box if you have any foreign partners, owners, or beneficiaries. See instructions . . . . . ☐

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):

Exempt payee code (if any)

Exemption from Foreign Account Tax Compliance Act (FATCA) reporting code (if any)

(Applies to accounts maintained outside the United States.)

5 Address (number, street, and apt. or suite no.). See instructions.

Requester's name and address (optional)

6 City, state, and ZIP code

7 List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

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

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

Social security number

			–		–				

or

Employer identification number

		–							

Part II Certification

Under penalties of perjury, I certify that:

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

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

Sign Here	**Signature of U.S. person**	**Date**

General Instructions

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

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

What's New

Line 3a has been modified to clarify how a disregarded entity completes this line. An LLC that is a disregarded entity should check the appropriate box for the tax classification of its owner. Otherwise, it should check the "LLC" box and enter its appropriate tax classification.

New line 3b has been added to this form. A flow-through entity is required to complete this line to indicate that it has direct or indirect foreign partners, owners, or beneficiaries when it provides the Form W-9 to another flow-through entity in which it has an ownership interest. This change is intended to provide a flow-through entity with information regarding the status of its indirect foreign partners, owners, or beneficiaries, so that it can satisfy any applicable reporting requirements. For example, a partnership that has any indirect foreign partners may be required to complete Schedules K-2 and K-3. See the Partnership Instructions for Schedules K-2 and K-3 (Form 1065).

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS is giving you this form because they

DEBARMENT CERTIFICATION

Neither my company nor an owner or principal of my company has been debarred, suspended, or otherwise made ineligible for participation in Federal Assistance programs under Executive Order 12549, "Debarment and Suspension," as described in the Federal Register and Rules and Regulations. Neither my company nor an owner or principal of my company is currently listed on the government-wide exclusions in SAM, debarred, suspended, or otherwise excluded by agencies or declared ineligible under any statutory or regulatory authority. My company agrees to immediately notify Waller County if my company or an owner or principal is later listed on the government-wide exclusions in SAM, or is debarred, suspended, or otherwise excluded by agencies or declared ineligible under any statutory or regulatory authority.

By signature below, I certify that the above is true, complete, and accurate, and that I am authorized by my company to make this certification.

Company Name	Date
Signature of Authorized Company Official	Printed Name

NO ISRAEL BOYCOTT CERTIFICATION

Effective September 1, 2017, as amended effective May 7, 2019 (H.B. 793), a Texas governmental entity may not enter into a contract with a value of $100,000 or more that is to be paid wholly or partly from public funds with a company (excluding a sole proprietorship) that has 10 or more full-time employees for goods or services unless the contract contains a written verification from the company that it: (1) does not boycott Israel; and (2) will not boycott Israel during the term of the Contract. (Tex. Gov't Code Ch. 2270). Accordingly, this certification form is included to the extent required by law.

"Boycott Israel" 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. Tex. Gov't Code §808.001(1).

By signature below, I certify and verify that Vendor does not boycott Israel and will not boycott Israel during the term of any contract awarded under this RFP, that this certification is true, complete, and accurate; and that I am authorized by my company to make this certification.

Company Name	
Signature of Authorized Company Official	Printed Name

NO ENERGY COMPANY BOYCOTT CERTIFICATION

Effective September 1, 2021, a Texas governmental entity may not enter into a contract with a value of $100,000 or more that is to be paid wholly or partly from public funds with a company (excluding a sole proprietorship) that has 10 or more full-time employees for goods or services unless the contract contains a written verification from the company that it: (1) does not boycott energy companies currently; and (2) will not boycott energy companies during the term of the Contract. (Tex. Gov't Code Ch. 2274). Accordingly, this certification form is included to the extent required by law.

"Boycott Energy Companies" means without an ordinary business purpose, 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 with a company because the company:

(a) engages in the exploration, production, utilization, transportation, sale, or manufacturing of fossil fuel-based energy and does not commit or pledge to meet environmental standards beyond applicable federal and state law; or

(b) does business with a company described by Paragraph (a) above. Tex. Gov't Code §809.001(1).

"Company" means a for-profit sole proprietorship, organization, association, corporation, partnership, joint venture, limited partnership, limited liability partnership, or any limited liability company, including a wholly owned subsidiary, majority-owned subsidiary, parent company or affiliate of those entities or business associations that exist to make a profit. (Tex. Gov't Code Ch. 2274.001(2)).

By signature below, I certify and verify that Vendor does not boycott energy companies and will not boycott energy companies during the term of any contract awarded under this RFP, that this certification is true, complete, and accurate; and that I am authorized by my company to make this certification.

_____	_____
Company Name	Date
_____	_____
Signature of Authorized Company Official	Printed Name

NO DISCRIMINATION AGAINST FIREARM AND AMMUNITION INDUSTRIES CERTIFICATION

Effective September 1, 2021, Chapter 2274 of the Texas Government Code provides that a Texas governmental entity may not enter into a contract with a company (excluding a sole proprietorship) for the purchase of goods or services unless the contract contains a written verification from the company that it (1) does not have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association, and (2) will not discriminate during the term of the contract against a firearm entity or firearm trade association. (Tex. Gov't Code §2274). Accordingly, this certification form is included to the extent required by law.

"Discriminate against a firearm entity or firearm trade association" means, with respect to the entity or association, to (1) refuse to engage in the trade of any goods or services with the entity or association based solely on its status as a firearm entity or firearm trade association; (2) refrain from continuing an existing business relationship with the entity or association based solely on its status as a firearm entity or firearm trade association; or (3) terminate an existing business relationship with the entity or association based solely on its status as a firearm entity or firearm trade association. The phrase does not include (1) the established policies of a merchant, retail seller, or platform that restrict or prohibit the listing or selling of ammunition, firearms, or firearm accessories; and (2) a company's refusal to engage in the trade of any goods or services, decision to refrain from continuing an existing business relationship, or decision to terminate an existing business relationship:

(a) to comply with federal, state, or local law, policy, or regulations or a directive by a regulatory agency; or

(b) for any traditional business reason that is specific to the customer or potential customer and not based solely on an entity's or association's status as a firearm entity or firearm trade association.

"Company" means a for-profit organization, association, corporation, partnership, joint venture, limited partnership, limited liability partnership, or limited liability company, including a wholly owned subsidiary, majority-owned subsidiary, parent company, or affiliate of those entities or associations that exists to make a profit.

By signature below, I certify and verify that Vendor does not discriminate against firearm and ammunition industries; that this certification is true, complete, and accurate; and that I am authorized by my company to make this certification.

_____	_____
Company Name	Date
_____	_____
Signature of Authorized Company Official	Printed Name

Attachment A. Prevailing Wages

"General Decision Number: TX20260063 05/18/2026

State: Texas

Construction Types: Heavy

Counties: Texas Counties of
Montgomery and Waller

Modification Number	Publication Date
0	01/02/2026
1	05/18/2026

SFTX0669-001 01/01/2025

	Rates	Fringes
SPRINKLER FITTER (FIRE SPRINKLERS)	$ 36.15	24.47

SUTX2005-024 06/14/2005

	Rates	Fringes
TRUCK DRIVER (WALLER COUNTY)	$ 12.28	0.98
TRUCK DRIVER (MONTGOMERY COUNTY)	$ 11.82	0.92
POWER EQUIPMENT OPERATOR: TRACTOR	$ 12.38	1.51
POWER EQUIPMENT OPERATOR: GRADER	$ 12.20	1.48
POWER EQUIPMENT OPERATOR: FRONT END LOADER - MONTGOMERY COUNTY	$ 12.30	0.57
POWER EQUIPMENT OPERATOR: FRONT END LOADER (WALLER COUNTY)	$ 11.75	0.92
POWER EQUIPMENT OPERATOR: BULLDOZER (WALLER COUNTY)	$ 12.46	0.00
POWER EQUIPMENT OPERATOR: BULLDOZER (MONTGOMERY COUNTY)	$ 13.12	0.00
POWER EQUIPMENT OPERATOR: BACKHOE	$ 13.25	0.00
POWER EQUIPMENT OPERATOR: (EXCAVATOR)	$ 16.74	0.00
POWER EQUIPMENT OPERATOR: (CRANE)	$ 14.91	0.58
PIPEFITTER	$ 17.00	0.04
LABORERS: PIPELAYER (WALLER COUNTY)	$ 10.07	0.00
LABORERS: PIPELAYER (MONTGOMEY COUNTY)	$ 10.04	0.00
LABORERS: MASON TENDER CEMENT	$ 9.96	0.00
LABORERS: LANDSCAPE	$ 7.35	0.00
LABORERS: COMMON (WALLER COUNTY)	$ 8.97	0.88
LABORERS: COMMON (MONTGOMERY COUNTY)	$ 8.83	0.94
IRONWORKER, REINFORCING:	$ 11.29	0.00
FORMBUILDER/FORMSETTER	$ 13.35	1.17
ELECTRICIAN	$ 18.40	1.34
CEMENT MASON/CONCRETE FINISHER	$ 11.37	1.13
CARPENTER	$ 14.38	0.00

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the

Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least $13.65 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract from May 11, 2026, through December 31, 2026. The applicable Executive Order minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under Executive Order 13658 is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than "SU", "UAVG", "SA", or "SC" denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The "SU" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

"SU" wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The "SA" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the "SA" identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

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

a) a survey underlying a wage determination
b) an existing published wage determination
c) an initial WHD letter setting forth a position on a wage determination matter
d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch

of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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END OF GENERAL DECISION

"

FEDERAL REQUIRMENTS

1. Resolution of Program Non-Compliance and Disallowed Costs

In the event of any dispute, claim, question, or disagreement arising from or relating to this Contract, or the breach thereof, including determination of responsibility for any costs disallowed as a result of non-compliance with federal, state or CDBG-MIT program requirements, the parties hereto shall use their best efforts to settle the dispute, claim, question or disagreement. To this effect, the parties shall consult and negotiate with each other in good faith within 30 days of receipt of a written notice of the dispute or invitation to negotiate, and attempt to reach a just and equitable solution satisfactory to both parties. If the matter is not resolved by negotiation within 30 days of receipt of written notice or invitation to negotiate, the parties agree first to try in good faith to settle the matter by mediation administered by the American Arbitration Association under its Commercial Mediation Procedures before resorting to arbitration, litigation, or some other dispute resolution procedure. The parties may enter into a written amendment to this Contract and choose a mediator that is not affiliated with the American Arbitration Association. The parties shall bear the costs of such mediation equally. *[This section may also provide for the qualifications of the mediator(s), the locale of meetings, time limits, or any other item of concern to the parties.]* If the matter is not resolved through such mediation within 60 days of the initiation of that procedure, either party may proceed to file suit.

2. Compliance with Davis-Bacon Act

All laborers and mechanics employed upon the work covered by this Contract shall be paid unconditionally and not less often than once each week, and without subsequent deduction or rebate on any account (except such payroll deductions as are made mandatory by law and such other payroll deductions as are permitted by the applicable regulations issued by the Secretary of Labor, United States Department of Labor, pursuant to the Anti-Kickback Act hereinafter identified), the full amount due at time of payment computed at wage rates not less than those contained in the wage determination decision of said Secretary of Labor (**a copy of which is attached as Attachment A. Prevailing Wages and herein incorporated by reference**), regardless of any contractual relationship which may be alleged to exist between the Contractor or any subcontractor and such laborers and mechanics. All laborers and mechanics employed upon such work shall be paid in cash, except that payment may be by check if the employer provides or secures satisfactory facilities approved by the City/County for the cashing of the same without cost or expense to the employee. For the purpose of this clause, contributions made or costs reasonably anticipated under Section 1 (b) (2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of Section 5.5 (a) (1) (iv) of Title 29, Code of Federal Regulations. Also for the purpose of this clause, regular contributions made or costs incurred for more than a weekly period under plans, funds, or programs, but covering the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

The Contractor and its subcontractors shall not, by any means, induce any person employed in the construction, completion, or repair of public work, give up any part of the compensation to which he or she is otherwise entitled. The City/County must report all suspected or reported violations to GLO.

3. Conflicts of Interest

(a) Governing Body. No member of the governing body of the City/County and no other officer, employee, or agent of the City/County, who exercises any functions or responsibilities in connection with administration, construction, engineering, or implementation of CDBG-MIT award between GLO and the City / County, shall have any personal financial interest, direct or indirect, in the Contractor or this Contract; and the Firm shall take appropriate steps to assure compliance.

(b) Other Local Public Officials. No other public official, who exercises any functions or responsibilities in connection with the planning and carrying out of administration, construction, engineering or implementation of the CDBG-MIT award between GLO and the City/County, shall have any personal financial interest, direct or indirect, in the Contractor or this Contract; and the Contractor shall take appropriate steps to assure compliance.

(a) The Contractor and Employees. The Contractor warrants and represents that it has no conflict of interest associated with the CDBG-MIT award between GLO and the City/County or this Contract. The Contractor further warrants and represents that it shall not acquire an interest, direct or indirect, in any geographic area that may benefit from the CDBG-MIT award between GLO and the City/County or in any business, entity, organization or person that may benefit from the award. The Contractor further agrees that it will not employ an individual with a conflict of interest as described herein.

4. Debarment and Suspension (Executive Orders 12549 and 12689)

The Contractor certifies, by entering into this Contract, that neither it nor its principals are presently debarred, suspended, or otherwise excluded from or ineligible for participation in federally-assisted programs under Executive Orders 12549 (1986) and 12689 (1989). The term "principal" for purposes of this Contract is defined as an officer, director, owner, partner, key employee, or other person with primary management or supervisory responsibilities, or a person who has a critical influence on or substantive control over the operations of the Contractor. The Contractor understands that it must not make any award or permit any award (or contract) at any tier to any party which is debarred or suspended or is otherwise excluded from or ineligible for participation in Federal assistance programs under Executive Order 12549, "Debarment and Suspension."

A contract award (see 2 CFR 180.220) must not be made to parties listed on the government-wide Excluded Parties List System in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR 180 that implement Executive Orders 12549 (3 CFR Part 1986 Comp., p. 189) and 12689 (3 CFR Part 1989 Comp., p. 235), ‘‘Debarment and Suspension.’’ SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549. 2 CFR 200 APPENDIX II (H)

5. [For Contracts that exceed $100,000] Byrd Anti-Lobbying

Byrd Anti-Lobbying Amendment (31 U.S.C. 1352)—Contractors that apply or bid for an award of $100,000 or more must file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier must also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award.

Such disclosures are forwarded from tier to tier up to the non-Federal award.

Contractor shall file the required certification: The undersigned certifies, to the best of his or her knowledge and belief, that:

(a) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(b) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, “Disclosure Form to Report Lobbying,” in accordance with its instructions.

(c) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly. 2 CFR 200 APPENDIX II (I) and 24 CFR §570.303

6. [For Contracts > $100K] Overtime Requirements

No Contractor or subcontractor contracting for any part of the Contract work which may require or involve the employment of laborers or mechanics, including watchmen and guards, shall require or permit any laborer or mechanic in any workweek in which he is employed on such work to work in excess of 40 hours in such work week unless such laborer or mechanic receives compensation at a rate not less than one and one-half times his basic rate of pay for all hours worked in excess of 40 hours in such work week, as the case may be. 2 CFR 200 APPENDIX II (E)

7. Equal Opportunity Clause

Comply with all Federal statutes relating to nondiscrimination. These include but are not limited to: (a)Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§16811683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C.§794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. §§6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended, relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. §§290 dd-3 and 290 ee-3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other non-discrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and, (j) the requirements of any other nondiscrimination statute(s) which may apply.

During the performance of this contract, the Contractor agrees as follows:

(a.) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(b.) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

(c.) The Contractor will not discourage or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

(d.) The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the Contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(e.) The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, "Equal Employment Opportunity," and of the rules, regulations, and relevant orders of the Secretary of Labor.

(f.) The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(g.) In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(h.) The Contractor will include the portion of the sentence immediately preceding paragraph (a) and the provisions of paragraphs (a) through (h) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon

each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, That in the event a Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency the Contractor may request the United States to enter into such litigation to protect the interests of the United States. 41 CFR §60-1.4(b) And 2 CFR 200 APPENDIX II (C)

8. Section 109 of the Housing and Community Development Act of 1974.

The Contractor shall comply with the provisions of Section 109 of the Housing and Community Development Act of 1974. No person in the United States shall on the ground of race, color, national origin, religion, or sex be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity funded in whole or in part with funds made available under this title.

9. Davis-Bacon Act, as amended (40 U.S.C. 3141-3148).

When required by Federal program legislation, all prime construction contracts in excess of $2,000 awarded by non-Federal entities must include a provision for compliance with the Davis-Bacon Act (40 U.S.C. 3141-3144, and 3146-3148) as supplemented by Department of Labor regulations (29 CFR Part 5, "Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction"). In accordance with the statute, contractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week. The non-Federal entity must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The decision to award a contract or subcontract must be conditioned upon the acceptance of the wage determination. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency. The contracts must also include a provision for compliance with the Copeland "Anti-Kickback" Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States"). The Act provides that each contractor or subrecipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency. 2 CFR 200 APPENDIX II (D)

10. Contract Work Hours and Safety Standards Act (40 U.S.C. 3701–3708).

Where applicable, all contracts awarded by the non-Federal entity in excess of $100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5).

Under 40 U.S.C. 3702 of the Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence. 2 CFR 200 APPENDIX II (E)

11. Section 504 Rehabilitation Act of 1973, as amended.

The Contractor agrees that no otherwise qualified individual with disabilities shall, solely by reason of his/her disability, be denied the benefits of, or be subjected to discrimination, including discrimination in employment, under any program or activity receiving federal financial assistance.

12. Age Discrimination Act of 1975.

The Contractor shall comply with the Age Discrimination Act of 1975 which provides that no person in the United States shall on the basis of age be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance.

13. Non-Segregated Facilities

The Contractor certifies that he does not and will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not and will not permit his employees any segregated facilities at any of his establishments, or permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. As used in this paragraph the term "segregated facilities" means any waiting rooms, work areas, rest rooms and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise.

14. The Provision of Local Training, Employment, and Business Opportunities

(a) To the greatest extent feasible opportunities for training and employment be given lower income residents of the project area and contracts for work in connection with the project be awarded to business concerns which are located in, or owned in substantial part by persons residing in the area of the project. See also GLO Section 3 Policy and “Exhibit G” on the GLO-DR website.

(b) The Contractor will include this clause in every subcontract for work in connection with the project.

15. Economic Opportunities for Section 3 Residents and Section 3 Business Concerns.

(a) The work to be performed under this Contract is subject to the requirements of section 3 of the Housing and Urban Development (HUD) Act of 1968, as amended, 12 U.S.C. 1701u (section 3). The purpose of section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

(b) The parties to this Contract agree to comply with HUD's regulations in 24 CFR part 135, which implement section 3. As evidenced by their execution of this Contract, the parties to this Contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 135 regulations.

(c) The Contractor agrees to send to each labor organization or representative of workers with which the Contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the Contractor's commitments under this section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.

(d) The Contractor agrees to include this section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 135. The Contractor will not subcontract with any subcontractor where the Contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 135.

(e) The Contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the Contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent the Contractor's obligations under 24 CFR part 135.

(f) Noncompliance with HUD's regulations in 24 CFR part 135 may result in sanctions, termination of this Contract for default, and debarment or suspension from future HUD assisted contracts.

(g) With respect to work performed in connection with section 3 covered Indian housing assistance, section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450e) also applies to the work to be performed under this Contract. Section 7(b) requires that to the greatest extent feasible (i) preference and opportunities for training and employment shall be given to Indians, and (ii) preference in the award of contracts and subcontracts shall be given to Indian organizations and Indian-owned Economic Enterprises. Parties to this contract that are subject to the provisions of section 3 and section 7(b) agree to comply with section 3 to the maximum extent feasible, but not in derogation of compliance with section 7(b). 24 CFR §135.38

16. Gender Neutral - Gender References

When necessary, unless the context clearly requires otherwise, any gender-specific or gender-neutral term in this Contract (for example, he, she, it, etc.) is to be read as referring to any other gender or to no gender.

17. Patent Rights and Inventions

Contractor shall comply with the requirements and regulations pertaining to patent rights with respect to any discovery or invention which arises or is developed in the course of or under such contract. (2 CFR 200 Appendix II (f) and Rights to Inventions in 37 CFR Part 401).

Rights to Inventions Made Under a Contract or Agreement - If the Federal award meets the definition of "funding agreement" under 37 CFR §401.2 (a) and the Subrecipient wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that "funding agreement," the Subrecipient must comply with the requirements of 37 CFR Part 401, "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements," and any implementing regulations issued by the awarding agency.

18. Energy Efficiency

The Contractor shall comply with the mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (42 U.S.C. 6201). (2 CFR 200 Appendix II (h)).

19. System for Award Management (SAM)

All contractors and subcontractors must be searched AND cleared (not suspended or debarred) prior to authorization to work on the project.

20. Solid Waste Disposal Act

Contractor must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR part

247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds $10,000 or the value of the quantity acquired during the preceding fiscal year exceeded $10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

21. Procurement of Recovered Materials

(a) In the performance of this contract, the Contractor shall make maximum use of products containing recovered materials that are EPA- designated items unless the product cannot be acquired—

1. Competitively within a timeframe providing for compliance with the contract performance schedule;

2. Meeting contract performance requirements; or

3. At a reasonable price.

(a) Information about this requirement, along with the list of EPA-designate items, is available at EPA's Comprehensive Procurement Guidelines web site, https://www.epa.gov/

58. Domestic Preference

a. As appropriate and to the extent consistent with law, Contractor should, to the greatest extent practicable, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products).

b. For purposes of section (a) above:

i. "Produced in the United States" means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.

ii. "Manufactured products" means items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.

STATE REQUIREMENTS

59. Verification No Boycott Israel.

As required by Chapter 2270, Government Code, CONTRACTOR hereby verifies that it does not boycott Israel and will not boycott Israel through the term of this Agreement. For purposes of this verification, "boycott Israel" 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.

60. Foreign Terrorist Organizations.

Pursuant to Chapter 2252, Texas Government Code, [Company] represents and certifies that, at the time of execution of this Agreement neither [Company], nor any wholly owned subsidiary, majority-owned subsidiary, parent company or affiliate of the same (i) engages in business with Iran, Sudan, or any foreign terrorist organization as described in Chapters 806 or 807 of the Texas Government Code, or Subchapter F of Chapter 2252 of the Texas Government Code, or (ii) is a company listed by the Texas Comptroller of Public Accounts under Sections 806.051, 807.051, or 2252.153 of the Texas Government Code. The term "foreign terrorist organization" in this paragraph has the meaning assigned to such term in Section 2252.151 of the Texas Government Code.

ENVIRONMENTAL CONDITIONS

61. [For Contracts > $150K] Clean Air Act and the Federal Water Pollution Control Act

The Contractor or subcontractor shall comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401–7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251–1387). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA). 2 CFR 200 APPENDIX II (G)

62. Lead-Based Paint

The Subrecipient agrees that any construction or rehabilitation of residential structures with assistance provided under this Agreement shall be subject to HUD Lead-Based Paint Regulations at 24 CFR 570.608, and 24 CFR Part 35, Subpart B. Such regulations pertain to all CDBG-assisted housing and require that all owners, prospective owners, and tenants of properties constructed prior to 1978 be properly notified that such properties may include lead-based paint. Such notification shall point out the hazards of lead-based paint and explain the symptoms, treatment and precautions that should be taken when dealing with lead-based paint poisoning and the advisability and availability of blood lead level screening for children under seven. The notice should also point out that if lead-based paint is found on the property, abatement measures may be undertaken. The regulations further require that, depending on the amount of Federal funds applied to a property, paint testing, risk assessment, treatment and/or abatement may be conducted.

63. Flood Disaster Protection

In accordance with the requirements of the Flood Disaster Protection Act of 1973 (42 U.S.C. 4001), the Subrecipient shall assure that for activities located in an area identified by the Federal

Emergency Management Agency (FEMA) as having special flood hazards, flood insurance under the National Flood Insurance Program is obtained and maintained as a condition of financial assistance for acquisition or construction purposes (including rehabilitation).

64. Other Conditions

USE OF CLOUD-BASED CERTIFIED PAYROLL SOLUTION. Prime construction contractor and all subcontractors subject to Davis-Bacon certified payroll or other prevailing wage compliance requirements are strongly encouraged to use LCP tracker, a cloud-based SaaS solution, for any certified payroll tracking, construction site compliance, and workforce reporting. Access to LCPtracker will be furnished by the grant project Administrator at no cost to the contractor.

65. Access to Information

(a) The U.S. Department of Housing and Urban Development (HUD), Inspectors General, the Comptroller General of the United States, the General Land Office (GLO), and the City/County, or any of their authorized
representatives, shall have access to any documents, papers, or other records of the Contractor which are pertinent to the CDBG-MIT award, in order to make audits, examinations, excerpts, and transcripts, and to closeout the City's/County's CDBG-MIT contract with GLO. 2 CFR 200.336 (former 24 CFR 85.36(i)(10)) The Office of the Comptroller General of the United States, the Government Accountability Office, the Office of Inspector General, or any authorized representative of the U.S. Government shall also have this right of inspection.

(b) Contractor shall include the substance of this clause in all subcontracts it awards.

Equal Opportunity Guidelines for Construction Contractors

Note: To be included in bid packet and distributed at the preconstruction conference (optional)

1. **What are the responsibilities of the offeror or bidder to ensure equal employment opportunity?**

   For contracts over $ 10,000, the offeror or bidder must comply with the "Equal Opportunity Clause" and the "Standard Federal Equal Opportunity Construction Contract Specifications."

2. **Are construction contractors required to ensure a legal working environment for all employees?**

   Yes, it is the construction contractor's responsibility to provide an environment free of harassment, intimidation, and coercion to all employees and to notify all foremen and supervisors to carry out this obligation, with specific attention to minority or female individuals.

3. **To alleviate developing separate facilities for men and women on all sites, can a construction contractor place all women employees on one site?**

   No, two or more women should be assigned to each site when possible.

4. **Are construction contractors required to make special outreach efforts to Section 3 or minority and female recruitment sources?**

   Yes, construction contractors must establish a current list of Section 3, minority and female recruitment sources. Notification of employment opportunities, including the availability of on-the-job training and apprenticeship programs, should be given to these sources. The efforts of the construction contractors should be kept in file.

5. **Should records be maintained on the number of Section 3 residents, minority and females applying for positions with construction contractors?**

   Yes, records must be maintained to include a current list of names, addresses and telephone numbers of all Section 3, minority and female applicants. The documentation should also include the results of the applications submitted.

6. **What happens if a woman or minority is sent to the union by the Contractor and is not referred back to the Contractor for employment?**

   If the unions impede the construction contractor's responsibility to provide equal employment opportunity, a written notice should be submitted to GLO.

7. **What efforts are made by construction contractors to create entry-level positions for Section 3 residents, women and minorities?**

   Construction contractors are required to develop on-the-job training programs, or participate in training programs, especially those funded by the Department of Labor, to create positions for Section 3 residents, women and minorities and to meet employment needs.

8. **Are any efforts made by the Contractor to publicize their Equal Employment Opportunity (EEO) policy?**
   Yes, the construction contractor is responsible for notifying unions and sources of training programs of their equal employment opportunity policy. Unions should be requested to cooperate in the effort of equal opportunity. The policy should be included in any appropriate manuals, or collective bargaining agreements. The construction contractor is encouraged to publicize the equal employment opportunity policy in the company newspaper and annual report. The Contractor is also responsible to include the EEO policy in all media advertisement.

9. **Are any in-service training programs provided for staff to update the EEO policy?**

   At least annually a review of the EEO policy and the affirmative action obligations are required of all personnel employees of a decision-making status. A record of the meeting including date, time,

location, persons present, subject matter discussed, and disposition of the subject matter should be maintained.

10. **What recruitment efforts are made for Section 3 residents, minorities and women?**

    The construction contractor must notify, both orally and in writing, Section 3, minority and female recruitment sources one month prior to the date of acceptance for apprenticeship or other training programs.

11. **Are any measures taken to encourage promotions for minorities and women?**

    Yes, an annual evaluation should be conducted for all minority and female personnel to encourage these employees to seek higher positions.

12. **What efforts are taken to insure that personnel policies are in accordance with the EEO policy?**

    Personnel policies in regard to job practices, work assignments, etc. should be continually monitored to insure that the EEO policy is carried out.

13. **Can women be excluded from utilizing any facilities available to men?**

    No, all facilities and company activities are non-segregated except for bathrooms or changing facilities to ensure privacy.

14. **What efforts should be utilized to include minority and female contractors and suppliers?**

    Take affirmative steps to ensure that small, minority, and women owned businesses are included on all lists for contractors/service providers. Solicit these businesses when issuing RFPs and RFQs and soliciting construction bids. Divide project activities into small tasks to allow participation. Keep records of all offers to minority and female construction contractors.

15. **If a construction contractor participates in a business related association that does not comply with equal opportunity affirmative action standards, does that show his/her failure to comply?**

    No, the construction contractor is responsible for its own compliance.

16. **Can a construction contractor hire a subcontractor who has been debarred from government contracts pursuant to EEO?**

    No. The construction contractor must suspend, terminate or cancel its contract with any Subcontractor who is in violation of the EEO policy.

17. **What effort has been taken by the construction contractor to monitor all employment to insure the company EEO policy is being carried out?**

    The construction contractor must designate a responsible individual to keep accurate records of all employees that includes specific information required by the government.

A. APPLICABILITY

The Project or Program to which the construction work covered by this Contract pertains is being assisted by the United States of America, and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

1. Minimum wages and fringe benefits

i. All laborers and mechanics employed or working upon the site of the work (or otherwise working in construction or development of the project under a development statute), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of basic hourly wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. As provided in 29 CFR 5.5(d) and (e), the appropriate wage determinations are effective by operation of law even if they have not been attached to the contract. Contributions made or costs reasonably anticipated for bona fide fringe benefits under the Davis-Bacon Act (40 U.S.C. 3141(2)(B)) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(v) of these contract clauses; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics must be paid the appropriate wage rate and fringe benefits on the wage determination for the classification(s) of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided,* That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classifications and wage rates conformed under 29 CFR 5.5(a)(1)(iii)) and the Davis-Bacon poster (WH-1321) must be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

ii. Frequently recurring classifications

A. In addition to wage and fringe benefit rates that have been determined to be prevailing under the procedures set forth in 29 CFR part 1, a wage determination may contain, pursuant to § 1.3(f), wage and fringe benefit rates for classifications of laborers and mechanics for which conformance requests are regularly submitted pursuant to 29 CFR 5.5(a)(1)(iii), provided that:

1. The work performed by the classification is not performed by a classification in the wage determination for which a prevailing wage rate has been determined;

2. The classification is used in the area by the construction industry; and

3. The wage rate for the classification bears a reasonable relationship to the prevailing wage rates contained in the wage determination.

B. The Administrator will establish wage rates for such classifications in accordance with 29 CFR 5.5(a)(1)(iii)(A)(3). Work performed in such a classification must be paid at no less than the wage and fringe benefit rate listed on the wage determination for such classification.

iii. Conformance

A. The contracting officer must require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract be

classified in conformance with the wage determination. Conformance of an additional classification and wage rate and fringe benefits is appropriate only when the following criteria have been met:

1. The work to be performed by the classification requested is not performed by a classification in the wage determination; and
2. The classification is used in the area by the construction industry; and
3. The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

B. The conformance process may not be used to split, subdivide, or otherwise avoid application of classifications listed in the wage determination.

C. If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken will be sent by the contracting officer by email to DBAconformance@dol.gov. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30–day period that additional time is necessary.

D. In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer will, by email to DBAconformance@dol.gov, refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30–day period that additional time is necessary.

E. The contracting officer must promptly notify the contractor of the action taken by the Wage and Hour Division under 29 CFR 5.5 (a)(1)(iii)(C) and (D). The contractor must furnish a written copy of such determination to each affected worker or it must be posted as a part of the wage determination. The wage rate (including fringe benefits where appropriate) determined pursuant to 29 CFR 5.5 (a)(1)(iii)(C) or (D) must be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

iv. Fringe benefits not expressed as an hourly rate

Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor may either pay the benefit as stated in the wage determination or may pay another bona fide fringe benefit or an hourly cash equivalent thereof.

v. Unfunded plans

If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided,* That the Secretary of Labor has found, upon the written request of the contractor, in accordance with the criteria set forth in 29 CFR 5.28, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

vi. Interest In the event of a failure to pay all or part of the wages required by the contract, the contractor will be required to pay interest on any underpayment of wages.

2. Withholding

i. Withholding requirements

The U. S. Department of Housing and Urban Development may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for the full amount of wages and monetary relief, including interest, required by the clauses set forth in 29 CFR 5.5(a) for violations of this contract, or to satisfy any such liabilities required by any other Federal contract, or federally assisted contract subject to Davis-Bacon labor standards, that is held by the same prime contractor (as defined in 29 CFR 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to Davis-Bacon labor standards requirements and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld. In the event of a contractor's failure to pay any laborer or mechanic, including any apprentice or helper working on the site of the work (or otherwise working in construction or development of the project under a development statute) all or part of the wages required by the contract, or upon the contractor's failure to submit the required records as discussed in 29 CFR 5.5(a)(3)(iv), HUD may on its own initiative and after written notice to the contractor, sponsor, applicant, owner, or other entity, as the case may be, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

ii. Priority to withheld funds

The Department has priority to funds withheld or to be withheld in accordance with 29 CFR 5.5(a)(2)(i) or (b)(3)(i), or both, over claims to those funds by:

- **A.** A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;
- **B.** A contracting agency for its reprocurement costs;
- **C.** A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;
- **D.** A contractor's assignee(s);
- **E.** A contractor's successor(s); or
- **F.** A claim asserted under the Prompt Payment Act, 31 U.S.C. 3901-3907.

3. Records and certified payrolls

i. Basic record requirements

- **A. Length of record retention.** All regular payrolls and other basic records must be maintained by the contractor and any subcontractor during the course of the work and preserved for all laborers and mechanics working at the site of the work (or otherwise working in construction or development of the project under a development statute) for a period of at least 3 years after all the work on the prime contract is completed.
- **B. Information required** Such records must contain the name; Social Security number; last known address, telephone number, and email address of each such worker; each worker's correct classification(s) of work actually performed; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 40 U.S.C. 3141(2)(B) of the Davis-Bacon Act); daily and weekly number of hours actually worked in total and on each covered contract; deductions made; and actual wages paid.
- **C. Additional records relating to fringe benefits**. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(v) that the wages of any laborer or mechanic include the amount of any

costs reasonably anticipated in providing benefits under a plan or program described in 40 U.S.C. 3141(2)(B) of the Davis-Bacon Act, the contractor must maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits.

D. **Additional records relating to apprenticeship** Contractors with apprentices working under approved programs must maintain written evidence of the registration of apprenticeship programs, the registration of the apprentices, and the ratios and wage rates prescribed in the applicable programs.

ii. **Certified payroll requirements**

A. **Frequency and method of submission** The contractor or subcontractor must submit weekly, for each week in which any DBA- or Related Acts-covered work is performed, certified payrolls to HUD if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the certified payrolls to the applicant, sponsor, owner, or other entity, as the case may be, that maintains such records, for transmission to HUD. The prime contractor is responsible for the submission of all certified payrolls by all subcontractors. A contracting agency or prime contractor may permit or require contractors to submit certified payrolls through an electronic system, as long as the electronic system requires a legally valid electronic signature; the system allows the contractor, the contracting agency, and the Department of Labor to access the certified payrolls upon request for at least 3 years after the work on the prime contract has been completed; and the contracting agency or prime contractor permits other methods of submission in situations where the contractor is unable or limited in its ability to use or access the electronic system

B. **Information required** The certified payrolls submitted must set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i)(B), except that full Social Security numbers and last known addresses, telephone numbers, and email addresses must not be included on weekly transmittals. Instead, the certified payrolls need only include an individually identifying number for each worker (*e.g.*, the last four digits of the worker's Social Security number). The required weekly certified payroll information may be submitted using Optional Form WH-347 or in any other format desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at *https://www.dol.gov/sites/dolgov/files/WHD/legacy/files/wh347.pdf* or its successor website. It is not a violation of this section for a prime contractor to require a subcontractor to provide full Social Security numbers and last known addresses, telephone numbers, and email addresses to the prime contractor for its own records, without weekly submission by the subcontractor to the sponsoring government agency (or the applicant, sponsor, owner, or other entity, as the case may be, that maintains such records).

C. **Statement of Compliance** Each certified payroll submitted must be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor, or the contractor's or subcontractor's agent who pays or supervises the payment of the persons working on the contract, and must certify the following:

1. That the certified payroll for the payroll period contains the information required to be provided under 29 CFR 5.5(a)(3)(ii), the appropriate information and basic records are being maintained under 29 CFR 5.5 (a)(3)(i), and such information and records are correct and complete;
2. That each laborer or mechanic (including each helper and apprentice) working on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly

from the full wages earned, other than permissible deductions as set forth in 29 CFR part 3; and

3. That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification(s) of work actually performed, as specified in the applicable wage determination incorporated into the contract.

D. **Use of Optional Form WH-347** The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 will satisfy the requirement for submission of the "Statement of Compliance" required by 29 CFR 5.5(a)(3)(ii)(C).

E. **Signature** The signature by the contractor, subcontractor, or the contractor's or subcontractor's agent must be an original handwritten signature or a legally valid electronic signature.

F. **Falsification** The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under 18 U.S.C. 1001 and 31 U.S.C. 3729.

G. **Length of certified payroll retention** The contractor or subcontractor must preserve all certified payrolls during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

iii. **Contracts, subcontracts, and related documents** The contractor or subcontractor must maintain this contract or subcontract and related documents including, without limitation, bids, proposals, amendments, modifications, and extensions. The contractor or subcontractor must preserve these contracts, subcontracts, and related documents during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

iv **Required disclosures and access**

A. **Required record disclosures and access to workers** The contractor or subcontractor must make the records required under 29 CFR 5.5(a)(3)(i)–(iii), and any other documents that HUD or the Department of Labor deems necessary to determine compliance with the labor standards provisions of any of the applicable statutes referenced by 29 CFR 5.1, available for inspection, copying, or transcription by authorized representatives of HUD or the Department of Labor, and must permit such representatives to interview workers during working hours on the job.

B. **Sanctions for non-compliance with records and worker access requirements** If the contractor or subcontractor fails to submit the required records or to make them available, or refuses to permit worker interviews during working hours on the job, the Federal agency may, after written notice to the contractor, sponsor, applicant, owner, or other entity, as the case may be, that maintains such records or that employs such workers, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available, or to permit worker interviews during working hours on the job, may be grounds for debarment action pursuant to 29 CFR 5.12. In addition, any contractor or other person that fails to submit the required records or make those records available to WHD within the time WHD requests that the records be produced will be precluded from introducing as evidence in an administrative proceeding under 29 CFR part 6 any of the required records that were not provided or made available to WHD. WHD will take into consideration a reasonable request from the contractor or person for an extension of the time for submission of records. WHD will determine the reasonableness of the request and may consider, among other things, the location of the records and the volume of production.

C. **Required information disclosures** Contractors and subcontractors must maintain the full Social Security number and last known address, telephone number, and email address of each covered worker, and must provide them upon request to HUD if the agency is a party to

the contract, or to the Wage and Hour Division of the Department of Labor. If the Federal agency is not such a party to the contract, the contractor, subcontractor, or both, must, upon request, provide the full Social Security number and last known address, telephone number, and email address of each covered worker to the applicant, sponsor, owner, or other entity, as the case may be, that maintains such records, for transmission to HUD, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or other compliance action.

4. Apprentices and equal employment opportunity

i. Apprentices

A. Rate of pay Apprentices will be permitted to work at less than the predetermined rate for the work they perform when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship (OA), or with a State Apprenticeship Agency recognized by the OA. A person who is not individually registered in the program, but who has been certified by the OA or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice, will be permitted to work at less than the predetermined rate for the work they perform in the first 90 days of probationary employment as an apprentice in such a program. In the event the OA or a State Apprenticeship Agency recognized by the OA withdraws approval of an apprenticeship program, the contractor will no longer be permitted to use apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

B. Fringe benefits Apprentices must be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringe benefits must be paid in accordance with that determination.

C. Apprenticeship ratio The allowable ratio of apprentices to journeyworkers on the job site in any craft classification must not be greater than the ratio permitted to the contractor as to the entire work force under the registered program or the ratio applicable to the locality of the project pursuant to 29 CFR 5.5(a)(4)(i)(D). Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated in 29 CFR 5.5(a)(4)(i)(A), must be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under this section must be paid not less than the applicable wage rate on the wage determination for the work actually performed.

D. Reciprocity of ratios and wage rates Where a contractor is performing construction on a project in a locality other than the locality in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyworker's hourly rate) applicable within the locality in which the construction is being performed must be observed. If there is no applicable ratio or wage rate for the locality of the project, the ratio and wage rate specified in the contractor's registered program must be observed.

ii Equal employment opportunity The use of apprentices and journeyworkers under this part must be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

5 Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

6 Subcontracts. The contractor or subcontractor must insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (11), along with the applicable wage determination(s) and such other clauses or contract modifications as the U.S. Department of Housing and Urban Development may by appropriate instructions require, and a clause requiring the subcontractors to include these clauses and wage determination(s) in any lower tier subcontracts. The prime contractor is responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this section. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and may be subject to debarment, as appropriate.

7 Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8 Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

9 Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility.

i. By entering into this contract, the contractor certifies that neither it nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of 40 U.S.C. 3144(b) or 29 CFR 5.12(a).

ii. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of 40 U.S.C. 3144(b) or 29 CFR 5.12(a).

iii. The penalty for making false statements is prescribed in the U.S. Code, Title 18 Crimes and Criminal Procedure, 18 U.S.C. 1001.

11 Anti-retaliation It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

- **i.** Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the DBA, Related Acts, or 29 CFR parts 1, 3, or 5;
- **ii.** Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under the DBA, Related Acts, or 29 CFR parts 1, 3, or 5;
- **iii.** Cooperating in any investigation or other compliance action, or testifying in any proceeding under the DBA, Related Acts, or 29 CFR parts 1, 3, or 5; or
- **iv.** Informing any other person about their rights under the DBA, Related Acts, or 29 CFR parts 1, 3, or 5.

B. Contract Work Hours and Safety Standards Act (CWHSSA)

The Agency Head must cause or require the contracting officer to insert the following clauses set forth in 29 CFR 5.5(b)(1), (2), (3), (4), and (5) in full, or (for contracts covered by the Federal Acquisition Regulation) by reference, in any contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses must

be inserted in addition to the clauses required by 29 CFR 5.5(a) or 4.6. As used in this paragraph, the terms "laborers and mechanics" include watchpersons and guards.

1. **Overtime requirements.** No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
2. **Violation; liability for unpaid wages; liquidated damages.** In the event of any violation of the clause set forth in 29 CFR 5.5(b)(1) the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages and interest from the date of the underpayment. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchpersons and guards, employed in violation of the clause set forth in 29 CFR 5.5(b)(1), in the sum of $31 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in 29 CFR 5.5(b)(1).
3. **Withholding for unpaid wages and liquidated damages**

i. **Withholding process** The U.S Department of Housing and Urban Development or the recipient of Federal assistance may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for any unpaid wages; monetary relief, including interest; and liquidated damages required by the clauses set forth in 29 CFR 5.5(b) on this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract subject to the Contract Work Hours and Safety Standards Act that is held by the same prime contractor (as defined in 29 CFR 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to the Contract Work Hours and Safety Standards Act and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld.

ii **Priority to withheld funds** The Department has priority to funds withheld or to be withheld in accordance with 29 CFR 5.5(a)(2)(i) or (b)(3)(i), or both, over claims to those funds by:

- **A.** A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;
- **B.** A contracting agency for its reprocurement costs;
- **C.** A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;
- **D.** A contractor's assignee(s);
- **E.** A contractor's successor(s); or
- **F.** A claim asserted under the Prompt Payment Act, 31 U.S.C. 3901-3907.

4. ***Subcontracts***. The contractor or subcontractor must insert in any subcontracts the clauses set forth in 29 CFR 5.5(b)(1) through (5) and a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor is responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in 29 CFR 5.5(b)(1) through (5). In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss,

due to any workers of lower-tier subcontractors, and associated liquidated damages and may be subject to debarment, as appropriate.

5 **Anti-retaliation** It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

- **i.** Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the Contract Work Hours and Safety Standards Act (CWHSSA) or its implementing regulations in 29 CFR part 5;
- **ii.** Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under CWHSSA or 29 CFR part 5;
- **iii.** Cooperating in any investigation or other compliance action, or testifying in any proceeding under CWHSSA or 29 CFR part 5; or
- **iv.** Informing any other person about their rights under CWHSSA or 29 CFR part 5.

C. CWHSSA required records clause In addition to the clauses contained in 29 CFR 5.5(b), in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other laws referenced by 29 CFR 5.1, the Agency Head must cause or require the contracting officer to insert a clause requiring that the contractor or subcontractor must maintain regular payrolls and other basic records during the course of the work and must preserve them for a period of 3 years after all the work on the prime contract is completed for all laborers and mechanics, including guards and watchpersons, working on the contract. Such records must contain the name; last known address, telephone number, and email address; and social security number of each such worker; each worker's correct classification(s) of work actually performed; hourly rates of wages paid; daily and weekly number of hours actually worked; deductions made and actual wages paid. Further, the Agency Head must cause or require the contracting officer to insert in any such contract a clause providing that the records to be maintained under this paragraph must be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview workers during working hours on the job.

D. Incorporation of contract clauses and wage determinations by reference Although agencies are required to insert the contract clauses set forth in this section, along with appropriate wage determinations, in full into covered contracts, and contractors and subcontractors are required to insert them in any lower-tier subcontracts, the incorporation by reference of the required contract clauses and appropriate wage determinations will be given the same force and effect as if they were inserted in full text.

E. Incorporation by operation of law The contract clauses set forth in this section (or their equivalent under the Federal Acquisition Regulation), along with the correct wage determinations, will be considered to be a part of every prime contract required by the applicable statutes referenced by 29 CFR 5.1 to include such clauses, and will be effective by operation of law, whether or not they are included or incorporated by reference into such contract, unless the Administrator grants a variance, tolerance, or exemption from the application of this paragraph. Where the clauses and applicable wage determinations are effective by operation of law under this paragraph, the prime contractor must be compensated for any resulting increase in wages in accordance with applicable law.

F. HEALTH AND SAFETY

The provisions of this paragraph (F) are applicable where the amount of the prime contract exceeds **$100,000**.

1. No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his or her health and safety, as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.
2. The contractor shall comply with all regulations issued by the Secretary of Labor pursuant to 29 CFR Part 1926 and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act, (Public Law 91-54, 83 Stat 96), 40 U.S.C. § 3701 et seq.
3. The contractor shall include the provisions of this paragraph in every subcontract, so that such provisions will be binding on each subcontractor. The contractor shall take such action with respect to any subcontractor as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

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GENERAL AFFIRMATIONS

TO THE EXTENT APPLICABLE, Subrecipient affirms and agrees to the following, without exception:

1. Subrecipient represents and warrants that, in accordance with Section 2155.005 of the Texas Government Code, neither Subrecipient nor the firm, corporation, partnership, or institution represented by Subrecipient, or anyone acting for such a firm, corporation, partnership, or institution has (1) violated any provision of the Texas Free Enterprise and Antitrust Act of 1983, Chapter 15 of the Texas Business and Commerce Code, or the federal antitrust laws, or (2) communicated directly or indirectly the contents of this Contract or any solicitation response upon which this Contract is based to any competitor or any other person engaged in the same line of business as Subrecipient.*
2. Subrecipient shall not assign its rights under the Contract or delegate the performance of its duties under the Contract without prior written approval from the GLO. Any attempted assignment or delegation in violation of this provision is void and without effect. This provision does not apply to subcontracting.
3. If the Contract is for services, Subrecipient shall comply with Section 2155.4441 of the Texas Government Code, requiring the purchase of products and materials produced in the State of Texas in performing service contracts, but for contracts subject to 2 CFR 200, only to the extent such compliance is consistent with 2 CFR 200.319.
4. Under Section 231.006 of the Family Code, the vendor or applicant [Subrecipient] certifies that the individual or business entity named in this Contract, bid or application is not ineligible to receive the specified grant, loan, or payment and acknowledges that this Contract may be terminated and payment may be withheld if this certification is inaccurate, in addition to other remedies set out in Section 231.006(f) of the Family Code.*
5. A bid or an application for a contract, grant, or loan paid from state funds must include the name and social security number of the individual or sole proprietor and each partner, shareholder, or owner with an ownership interest of at least 25 percent of the business entity submitting the bid or application. Subrecipient certifies it has submitted this information to the GLO.*
6. If the Contract is for a "cloud computing service" as defined by Texas Government Code Section 2157.007, then pursuant to Section 2054.0593(d)-(f) of the Texas Government Code, relating to cloud computing state risk and authorization management program, Subrecipient represents and warrants that it complies with the requirements of the state risk and authorization management program and Subrecipient agrees that throughout the term of the Contract it shall maintain its certifications and comply with the program requirements in the performance of the Contract.
7. If the Contract is for the purchase or lease of computer equipment, as defined by Texas Health and Safety Code Section 361.952(2), Subrecipient certifies that it is in compliance with Subchapter Y, Chapter 361 of the Texas Health and Safety Code, related to the Computer Equipment Recycling Program and the Texas Commission on Environmental Quality rules in Title 30 Texas Administrative Code Chapter 328.
8. If the Contract authorizes Subrecipient to access, transmit, use, or store data for the GLO, then in accordance with Section 2054.138 of the Texas Government Code, Subrecipient certifies that it will comply with the security controls required under this Contract and will

* This section does not apply to a contract with a "governmental entity" as defined in Texas Government Code Chapter 2251.

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maintain records and make them available to the GLO as evidence of Subrecipient's compliance with the required controls.

9. Subrecipient represents and warrants that it has not given, offered to give, nor intends to give at any time hereafter any economic opportunity, future employment, gift, loan, gratuity, special discount, trip, favor, or service to a public servant in connection with the Contract.

10. Subrecipient agrees that any payments due under the Contract shall be applied towards any debt or delinquency that is owed by Subrecipient to the State of Texas.

11. Upon request of the GLO, Subrecipient shall provide copies of its most recent business continuity and disaster recovery plans.

12. If the Contract is for consulting services governed by Texas Government Code Chapter 2254, Subchapter B, in accordance with Section 2254.033 of the Texas Government Code, relating to consulting services, Subrecipient certifies that it does not employ an individual who has been employed by the GLO or another agency at any time during the two years preceding the Subrecipient's submission of its offer to provide consulting services to the GLO or, in the alternative Subrecipient, in its offer to provide consulting services to the GLO, disclosed the following: (i) the nature of the previous employment with the GLO or other state agency; (ii) the date the employment was terminated; and (iii) the annual rate of compensation for the employment at the time of its termination.*

13. If the Contract is not for architecture, engineering, or construction services, then except as otherwise provided by statute, rule, or regulation, Subrecipient must use the dispute resolution process provided for in Chapter 2260 of the Texas Government Code to attempt to resolve any dispute arising under the Contract. NOTHING IN THIS SECTION SHALL BE CONSTRUED AS A WAIVER OF SOVEREIGN IMMUNITY BY THE GLO OR, IF APPLICABLE, OF GOVERNMENTAL IMMUNITY BY SUBRECIPIENT.

14. If the Contract is for architecture, engineering, or construction services, then subject to Texas Government Code Section 2260.002 and Texas Civil Practice and Remedies Code Chapter 114, and except as otherwise provided by statute, rule, or regulation, Subrecipient shall use the dispute resolution process provided for in Chapter 2260 of the Texas Government Code to attempt to resolve all disputes arising under this Contract. Except as otherwise provided by statute, rule, or regulation, in accordance with the Texas Civil Practice and Remedies Code, Section 114.005, claims encompassed by Texas Government Code, Section 2260.002(3) and Texas Civil Practice and Remedies Code Section 114.002 shall be governed by the dispute resolution process set forth below in subsections (a)-(d). NOTHING IN THIS SECTION SHALL BE CONSTRUED AS A WAIVER OF SOVEREIGN IMMUNITY BY THE GLO OR, IF APPLICABLE, OF GOVERNMENTAL IMMUNITY BY SUBRECIPIENT.

    a. Notwithstanding Texas Government Code, Chapter 2260.002(3) and Chapter 114.012 and any other statute or applicable law, if Subrecipient's claim for breach of contract cannot be resolved by the Parties in the ordinary course of business, Subrecipient may make a claim against the GLO for breach of contract and the GLO may assert a counterclaim against Subrecipient as is contemplated by Texas Government Code, Chapter 2260, Subchapter B. In such event, Subrecipient must provide written notice to the GLO of a claim for breach of the Contract not later than the 180th day after the date

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of the event giving rise to the claim. The notice must state with particularity: (1) the nature of the alleged breach; (2) the amount Subrecipient seeks as damages; and (3) the legal theory of recovery.

b. The chief administrative officer, or if designated in the Contract, another officer of the GLO, shall examine the claim and any counterclaim and negotiate with Subrecipient in an effort to resolve them. The negotiation must begin no later than the 120th day after the date the claim is received, as is contemplated by Texas Government Code, Chapter 2260, Section 2260.052.

c. If the negotiation under paragraph (b) above results in the resolution of some disputed issues by agreement or in a settlement, the Parties shall reduce the agreement or settlement to writing and each Party shall sign the agreement or settlement. A partial settlement or resolution of a claim does not waive a Party's rights under this Contract as to the parts of the claim that are not resolved.

d. If a claim is not entirely resolved under paragraph (b) above, on or before the 270th day after the date the claim is filed with the GLO, unless the Parties agree in writing to an extension of time, the Parties may agree to mediate a claim made under this dispute resolution procedure. This dispute resolution procedure is Subrecipient's sole and exclusive process for seeking a remedy for an alleged breach of contract by the GLO if the Parties are unable to resolve their disputes as described in this section.

e. Nothing in the Contract shall be construed as a waiver of the state's or the GLO's sovereign immunity, or, if applicable, the governmental immunity of Subrecipient. This Contract shall not constitute or be construed as a waiver of any of the privileges, rights, defenses, remedies, or immunities available to the State of Texas or Subrecipient. The failure to enforce, or any delay in the enforcement, of any privileges, rights, defenses, remedies, or immunities available to the State of Texas or, if applicable, of Subrecipient under this Contract or under applicable law shall not constitute a waiver of such privileges, rights, defenses, remedies or immunities or be considered as a basis for estoppel. The GLO does not waive any privileges, rights, defenses, or immunities available to it by entering into this Contract or by its conduct, or by the conduct of any representative of the GLO, prior to or subsequent to entering into this Contract. Subrecipient does not waive any privileges, rights, defenses, or immunities available to it by entering into this Contract or by its conduct, or by the conduct of any representative of the GLO, prior to or subsequent to entering into this Contract.

f. Except as otherwise provided by statute, rule, or regulation, compliance with the dispute resolution process provided for in Texas Government Code, Chapter 2260, subchapter B and incorporated by reference in subsection (a)-(d) above is a condition precedent to the Subrecipient: (1) filing suit pursuant to Chapter 114 of the Civil Practices and Remedies Code; or (2) initiating a contested case hearing pursuant to Subchapter C of Chapter 2260 of the Texas Government Code.

15. If Chapter 2271 of the Texas Government Code applies to this Contract, Subrecipient verifies that it does not boycott Israel and will not boycott Israel during the term of the Contract.*

16. This Contract is contingent upon the continued availability of lawful appropriations by the Texas Legislature. Subrecipient understands that all obligations of the GLO under this

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Contract are subject to the availability of funds. If such funds are not appropriated or become unavailable, the GLO may terminate the Contract. The Contract shall not be construed as creating a debt on behalf of the GLO in violation of Article III, Section 49a of the Texas Constitution.

17. Subrecipient certifies that it is not listed in the prohibited vendors list authorized by Executive Order 13224, "Blocking Property and Prohibiting Transactions with Persons Who Commit, Threaten to Commit, or Support Terrorism", published by the United States Department of the Treasury, Office of Foreign Assets Control.
18. In accordance with Section 669.003 of the Texas Government Code, relating to contracting with the executive head of a state agency, Subrecipient certifies that it is not (1) the executive head of the GLO, (2) a person who at any time during the four years before the effective date of the Contract was the executive head of the GLO, or (3) a person who employs a current or former executive head of the GLO.
19. Subrecipient represents and warrants that all statements and information prepared and submitted in connection with this Contract are current, complete, true, and accurate. Submitting a false statement or making a material misrepresentation during the performance of this Contract is a material breach of contract and may void the Contract or be grounds for its termination.
20. Pursuant to Section 2155.004(a) of the Texas Government Code, Subrecipient certifies that neither Subrecipient nor any person or entity represented by Subrecipient has received compensation from the GLO to participate in the preparation of the specifications or solicitation on which this Contract is based. Under Section 2155.004(b) of the Texas Government Code, Subrecipient certifies that the individual or business entity named in this Contract is not ineligible to receive the specified Contract and acknowledges that the Contract may be terminated and payment withheld if this certification is inaccurate. This Section does not prohibit Subrecipient from providing free technical assistance.*
21. Subrecipient represents and warrants that it is not engaged in business with Iran, Sudan, or a foreign terrorist organization, as prohibited by Section 2252.152 of the Texas Government Code.*
22. In accordance with Section 2252.901 of the Texas Government Code, for the categories of contracts listed in that section, Subrecipient represents and warrants that none of its employees including, but not limited to, those authorized to provide services under the contract, were employees of the GLO during the twelve (12) month period immediately prior to the date of execution of the contract. Solely for professional services contracts as described by Chapter 2254 of the Texas Government Code, Subrecipient further represents and warrants that if a former employee of the GLO was employed by Subrecipient within one year of the employee's leaving the GLO, then such employee will not perform services on projects with Subrecipient that the employee worked on while employed by the GLO.*
23. The Contract shall be governed by and construed in accordance with the laws of the State of Texas, without regard to the conflicts of law provisions. The venue of any suit arising under the Contract is fixed in any court of competent jurisdiction of Travis County, Texas, unless the specific venue is otherwise identified in a statute which directly names or otherwise identifies its applicability to any Party.

* This section does not apply to a contract with a "governmental entity" as defined in Texas Government Code Chapter 2251.

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24. IF THE CONTRACT IS NOT FOR ARCHITECTURE OR ENGINEERING SERVICES GOVERNED BY TEXAS GOVERNMENT CODE CHAPTER 2254, SUBRECIPIENT, TO THE EXTENT ALLOWED BY LAW, SHALL DEFEND, INDEMNIFY AND HOLD HARMLESS THE STATE OF TEXAS AND THE GLO, AND/OR THEIR OFFICERS, AGENTS, EMPLOYEES, REPRESENTATIVES, CONTRACTORS, ASSIGNEES, AND/OR DESIGNEES FROM ANY AND ALL LIABILITY, ACTIONS, CLAIMS, DEMANDS, OR SUITS, AND ALL RELATED COSTS, ATTORNEY FEES, AND EXPENSES ARISING OUT OF, OR RESULTING FROM ANY ACTS OR OMISSIONS OF SUBRECIPIENT OR ITS AGENTS, EMPLOYEES, SUBCONTRACTORS, ORDER FULFILLERS, OR SUPPLIERS OF SUBCONTRACTORS IN THE EXECUTION OR PERFORMANCE OF THE CONTRACT AND ANY PURCHASE ORDERS ISSUED UNDER THE CONTRACT. THE DEFENSE SHALL BE COORDINATED BY SUBRECIPIENT WITH THE OFFICE OF THE TEXAS ATTORNEY GENERAL WHEN TEXAS STATE AGENCIES ARE NAMED DEFENDANTS IN ANY LAWSUIT AND SUBRECIPIENT MAY NOT AGREE TO ANY SETTLEMENT WITHOUT FIRST OBTAINING THE CONCURRENCE FROM THE OFFICE OF THE TEXAS ATTORNEY GENERAL. SUBRECIPIENT AND THE GLO SHALL FURNISH TIMELY WRITTEN NOTICE TO EACH OTHER OF ANY SUCH CLAIM.*

25. IF THE CONTRACT IS FOR ARCHITECTURE OR ENGINEERING SERVICES GOVERNED BY TEXAS GOVERNMENT CODE CHAPTER 2254, SUBRECIPIENT, TO THE EXTENT ALLOWED BY LAW, SHALL INDEMNIFY AND HOLD HARMLESS THE STATE OF TEXAS AND THE GLO, AND/OR THEIR OFFICERS, AGENTS, EMPLOYEES, REPRESENTATIVES, CONTRACTORS, ASSIGNEES, AND/OR DESIGNEES FROM ANY AND ALL LIABILITY, ACTIONS, CLAIMS, DEMANDS, OR SUITS, AND ALL RELATED DAMAGES, COSTS, ATTORNEY FEES, AND EXPENSES TO THE EXTENT CAUSED BY, ARISING OUT OF, OR RESULTING FROM ANY ACTS OF NEGLIGENCE, INTENTIONAL TORTS, WILLFUL MISCONDUCT, PERSONAL INJURY OR DAMAGE TO PROPERTY, AND/OR OTHERWISE RELATED TO SUBRECIPIENT'S PERFORMANCE, AND/OR FAILURES TO PAY A SUBCONTRACTOR OR SUPPLIER BY THE SUBRECIPIENT OR ITS AGENTS, EMPLOYEES, SUBCONTRACTORS, ORDER FULFILLERS, CONSULTANTS UNDER CONTRACT TO SUBRECIPIENT, OR ANY OTHER ENTITY OVER WHICH SUBRECIPIENT EXERCISES CONTROL, OR SUPPLIERS OF SUBCONTRACTORS IN THE EXECUTION OR PERFORMANCE OF THE CONTRACT. THE DEFENSE SHALL BE COORDINATED BY SUBRECIPIENT WITH THE OFFICE OF THE TEXAS ATTORNEY GENERAL WHEN TEXAS STATE AGENCIES ARE NAMED DEFENDANTS IN ANY LAWSUIT AND SUBRECIPIENT MAY NOT AGREE TO ANY SETTLEMENT WITHOUT FIRST OBTAINING THE CONCURRENCE FROM THE OFFICE OF THE TEXAS ATTORNEY GENERAL. SUBRECIPIENT AND THE GLO SHALL FURNISH TIMELY WRITTEN NOTICE TO EACH OTHER OF ANY SUCH CLAIM.*

26. TO THE EXTENT ALLOWED BY LAW, SUBRECIPIENT SHALL DEFEND, INDEMNIFY, AND HOLD HARMLESS THE GLO AND THE STATE OF TEXAS FROM AND AGAINST ANY AND ALL CLAIMS, VIOLATIONS, MISAPPROPRIATIONS OR INFRINGEMENT OF ANY PATENT, TRADEMARK, COPYRIGHT, TRADE SECRET OR OTHER INTELLECTUAL PROPERTY RIGHTS AND/OR OTHER INTANGIBLE

* This section does not apply to a contract with a "governmental entity" as defined in Texas Government Code Chapter 2251.

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PROPERTY, PUBLICITY OR PRIVACY RIGHTS, AND/OR IN CONNECTION WITH OR ARISING FROM: (1) THE PERFORMANCE OR ACTIONS OF SUBRECIPIENT PURSUANT TO THIS CONTRACT; (2) ANY DELIVERABLE, WORK PRODUCT, CONFIGURED SERVICE OR OTHER SERVICE PROVIDED HEREUNDER; AND/OR (3) THE GLO'S AND/OR SUBRECIPIENT'S USE OF OR ACQUISITION OF ANY REQUESTED SERVICES OR OTHER ITEMS PROVIDED TO THE GLO BY SUBRECIPIENT OR OTHERWISE TO WHICH THE GLO HAS ACCESS AS A RESULT OF SUBRECIPIENT'S PERFORMANCE UNDER THE CONTRACT. SUBRECIPIENT AND THE GLO SHALL FURNISH TIMELY WRITTEN NOTICE TO EACH OTHER OF ANY SUCH CLAIM. SUBRECIPIENT SHALL BE LIABLE TO PAY ALL COSTS OF DEFENSE, INCLUDING ATTORNEYS' FEES. THE DEFENSE SHALL BE COORDINATED BY SUBRECIPIENT WITH THE OFFICE OF THE TEXAS ATTORNEY GENERAL (OAG) WHEN TEXAS STATE AGENCIES ARE NAMED DEFENDANTS IN ANY LAWSUIT AND SUBRECIPIENT MAY NOT AGREE TO ANY SETTLEMENT WITHOUT FIRST OBTAINING THE CONCURRENCE FROM OAG. IN ADDITION, SUBRECIPIENT WILL REIMBURSE THE GLO AND THE STATE OF TEXAS FOR ANY CLAIMS, DAMAGES, COSTS, EXPENSES OR OTHER AMOUNTS, INCLUDING, BUT NOT LIMITED TO, ATTORNEYS' FEES AND COURT COSTS, ARISING FROM ANY SUCH CLAIM. IF THE GLO DETERMINES THAT A CONFLICT EXISTS BETWEEN ITS INTERESTS AND THOSE OF SUBRECIPIENT OR IF THE GLO IS REQUIRED BY APPLICABLE LAW TO SELECT SEPARATE COUNSEL, THE GLO WILL BE PERMITTED TO SELECT SEPARATE COUNSEL AND SUBRECIPIENT WILL PAY ALL REASONABLE COSTS OF THE GLO'S COUNSEL.*

27. Subrecipient has disclosed in writing to the GLO all existing or known potential conflicts of interest relative to the performance of the Contract.

28. Sections 2155.006 and 2261.053 of the Texas Government Code prohibit state agencies from accepting a solicitation response or awarding a contract that includes proposed financial participation by a person who, in the past five years, has been convicted of violating a federal law or assessed a penalty in connection with a contract involving relief for Hurricane Rita, Hurricane Katrina, or any other disaster, as defined by Section 418.004 of the Texas Government Code, occurring after September 24, 2005. Under Sections 2155.006 and 2261.053 of the Texas Government Code, Subrecipient certifies that the individual or business entity named in this Contract is not ineligible to receive the specified Contract and acknowledges that this Contract may be terminated and payment withheld if this certification is inaccurate.*

29. The person executing this Contract certifies that he/she is duly authorized to execute this Contract on his/her own behalf or on behalf of Subrecipient and legally empowered to contractually bind Subrecipient to the terms and conditions of the Contract and related documents.

30. If the Contract is for architectural or engineering services, pursuant to Section 2254.0031 of the Texas Government Code, which incorporates by reference Section 271.904(d) of the Texas Local Government Code, Subrecipient shall perform services (1) with professional skill and care ordinarily provided by competent engineers or architects practicing under the same or similar circumstances and professional license, and (2) as expeditiously as is prudent considering the ordinary professional skill and care of a competent engineer or architect.*

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31. The state auditor may conduct an audit or investigation of any entity receiving funds from the state directly under the Contract or indirectly through a subcontract under the Contract. The acceptance of funds directly under the Contract or indirectly through a subcontract under the Contract acts as acceptance of the authority of the state auditor, under the direction of the legislative audit committee, to conduct an audit or investigation in connection with those funds. Under the direction of the legislative audit committee, an entity that is the subject of an audit or investigation by the state auditor must provide the state auditor with access to any information the state auditor considers relevant to the investigation or audit. Subrecipient shall ensure that this paragraph concerning the authority to audit funds received indirectly by subcontractors through the Contract and the requirement to cooperate is included in any subcontract it awards. The GLO may unilaterally amend the Contract to comply with any rules and procedures of the state auditor in the implementation and enforcement of Section 2262.154 of the Texas Government Code.

32. Subrecipient certifies that neither it nor its principals are debarred, suspended, proposed for debarment, declared ineligible, or otherwise excluded from participation in the Contract by any state or federal agency.

33. If the Contract is for the purchase or lease of covered television equipment, as defined by Section 361.971(3) of the Texas Health and Safety Code, Subrecipient certifies its compliance with Subchapter Z, Chapter 361 of the Texas Health and Safety Code, related to the Television Equipment Recycling Program.

34. Pursuant to Section 572.069 of the Texas Government Code, Subrecipient certifies it has not employed and will not employ a former state officer or employee who participated in a procurement or contract negotiations for the GLO involving Subrecipient within two (2) years after the date that the contract is signed or the procurement is terminated or withdrawn. This certification only applies to former state officers or employees whose state service or employment ceased on or after September 1, 2015.

35. The GLO shall post this Contract to the GLO's website. Subrecipient understands that the GLO will comply with the Texas Public Information Act (Texas Government Code Chapter 552, the "PIA"), as interpreted by judicial rulings and opinions of the Attorney General of the State of Texas (the "Attorney General"). Information, documentation, and other material in connection with this Contract may be subject to public disclosure pursuant to the PIA. In accordance with Section 2252.907 of the Texas Government Code, Subrecipient is required to make any information created or exchanged with the GLO or the State of Texas pursuant to the Contract, and not otherwise excepted from disclosure under the PIA, available to the GLO in portable document file (".pdf") format or any other format agreed upon between the Parties that is accessible by the public at no additional charge to the GLO or the State of Texas. By failing to mark any information that Subrecipient believes to be excepted from disclosure as "confidential" or a "trade secret," Subrecipient waives any and all claims it may make against the GLO for releasing such information without prior notice to Subrecipient. The Attorney General will ultimately determine whether any information may be withheld from release under the PIA. Subrecipient shall notify the GLO's Office of General Counsel within twenty-four (24) hours of receipt of any third-party written requests for information and forward a copy of said written requests to PIALegal@glo.texas.gov. If a request for information was not written, Subrecipient shall forward the third party's contact information to the above-designated e-mail address.

* This section does not apply to a contract with a "governmental entity" as defined in Texas Government Code Chapter 2251.

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36. The GLO does not tolerate any type of fraud. GLO policy promotes consistent, legal, and ethical organizational behavior by assigning responsibilities and providing guidelines to enforce controls. Any violations of law, agency policies, or standards of ethical conduct will be investigated, and appropriate actions will be taken. Subrecipient must report any possible fraud, waste, or abuse that occurs in connection with the Contract to the GLO in the manner prescribed by the GLO's website, http://glo.texas.gov.
37. If Subrecipient, in its performance of the Contract, has access to a state computer system or database, Subrecipient must complete a cybersecurity training program certified under Texas Government Code Section 2054.519, as selected by the GLO. Subrecipient must complete the cybersecurity training program during the initial term of the Contract and during any renewal period. Subrecipient must verify in writing to the GLO its completion of the cybersecurity training program.
38. Under Section 2155.0061, Texas Government Code, Subrecipient certifies that the entity named in this Contract is not ineligible to receive the specified Contract and acknowledges that this Contract may be terminated and payment withheld if this certification is inaccurate.*
39. Subrecipient certifies that it does not require its customers to provide any documentation certifying the customer's COVID-19 vaccination or post-transmission recovery on entry to, to gain access to, or to receive service from Subrecipient's business. Subrecipient acknowledges that such a vaccine or recovery requirement would make Subrecipient ineligible for a state-funded contract.
40. Pursuant to Government Code Section 2275.0102, Subrecipient certifies that neither it nor its parent company, nor any affiliate of Subrecipient or its parent company, is: (1) majority owned or controlled by citizens or governmental entities of China, Iran, North Korea, Russia, or any other country designated by the Governor under Government Code Section 2275.0103, or (2) headquartered in any of those countries.*
41. If Subrecipient is required to make a verification pursuant to Section 2276.002 of the Texas Government Code, Subrecipient verifies that Subrecipient does not boycott energy companies and will not boycott energy companies during the term of the Contract. If Subrecipient does not make that verification, Subrecipient must notify the GLO and state why the verification is not required.*
42. If Subrecipient is required to make a verification pursuant to Section 2274.002 of the Texas Government Code, Subrecipient verifies that it (1) does not have a practice, policy, guidance, or directive that discriminates against a "firearm entity" or "firearm trade association" as those terms are defined in Texas Government Code section 2274.001 and (2) will not discriminate during the term of the Contract against a firearm entity or firearm trade association. If Subrecipient does not make that verification, Subrecipient must notify the GLO and state why the verification is not required.*
43. If Subrecipient is a "professional sports team" as defined by Texas Occupations Code Section 2004.002, Subrecipient will play the United States national anthem at the beginning of each team sporting event held at Subrecipient's home venue or other venue controlled by Subrecipient for the event. Failure to comply with this obligation constitutes a default of this Contract, and immediately subjects Subrecipient to the penalties for default, such as repayment of money received or ineligibility for additional money. In addition, Subrecipient

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may be debarred from contracting with the State. The GLO or the Attorney General may strictly enforce this provision.*

44. To the extent Section 552.371 of the Texas Government Code applies to Subrecipient and the Contract, in accordance with Section 552.372 of the Texas Government Code, Subrecipient must (a) preserve all contracting information related to the Contract in accordance with the records retention requirements applicable to the GLO for the duration of the Contract, (b) no later than the tenth business day after the date of the GLO's request, provide to the GLO any contracting information related to the Contract that is in Subrecipient's custody or possession, and (c) on termination or expiration of the Contract, either (i) provide to the GLO at no cost all contracting information related to the Contract that is in Subrecipient's custody or possession or (ii) preserve the contracting information related to the Contract in accordance with the records retention requirements applicable to the GLO. Except as provided by Section 552.374(c) of the Texas Government Code, the requirements of Subchapter J, Chapter 552, Government Code, may apply to the Contract and Subrecipient agrees that the Contract may be terminated if Subrecipient knowingly or intentionally fails to comply with a requirement of that subchapter.*

45. If the Contract is for consulting services governed by Chapter 2254 of the Texas Government Code, Subrecipient, upon completion of the Contract, must give the GLO a compilation, in a digital medium agreed to by the Parties, of all documents, films, recordings, or reports Subrecipient compiled in connection with its performance under the Contract.*

46. If subject to 2 CFR 200.216, Subrecipient shall not obligate or expend funding provided under this Contract to: (a) procure or obtain; (b) extend or renew a contract to procure or obtain; or (c) enter into a contract to procure or obtain equipment, services, or systems that uses covered telecommunications equipment or services, as defined in Public Law 115-232, Section 889, as a substantial or essential component of any system, or as critical technology as part of any system.

47. To the extent Texas Government Code Chapter 2252, Subchapter G applies to the Contract, any iron or steel product Subrecipient uses in in its performance of the Contract that is produced through a manufacturing process, as defined in Section 2252.201(2) of the Texas Government Code, must be produced in the United States.

* This section does not apply to a contract with a "governmental entity" as defined in Texas Government Code Chapter 2251.

Attachment C. Federal Forms

STATEMENT OF BIDDER'S QUALIFICATIONS

All questions must be answered and the data given must be clear and comprehensive. **This statement must be notarized.** If necessary, questions may be answered on separate attached sheets. The Bidder may submit any additional information it desires.

Date: _____

Bidder (Legal Name of Firm):_____

Date Organized:_____

Name of Owner(s):_____

Address:_____

_____

Date Incorporated_____

Federal ID Number: _____

Number of Years in contracting business under present name_____

List all other names under which your business has operated in the last 10 years:

Work Presently Under Contract:

Contract	Amount $	Completion Date

Type of work performed by your company: _____

Total Staff employed by Firm (Break down by Managers and Trades on separate sheet):

_____

_____

_____

Have you ever failed to complete any work awarded to you? ☐ Yes ☐ No

(If yes, please attach summary of details on a separate sheet. Include brief explanation of cause and resolution)

Have you ever defaulted on a contract? ☐ Yes ☐ No

(If yes, please attach summary of details on a separate sheet.)

Has your organization had any disbarments or suspensions that have been imposed in the past five years or that was still in effect during the five-year period or is still in effect? ☐ Yes ☐ No

(If yes, list and explain; such list must include disbarments and suspensions of officers, principals, partners,

members, and employees of your organization.)

List the projects most recently completed by your firm (include project of similar importance):

Project Amount $ Mo/Yr Completed

_____

_____

_____

Major equipment available for **this** contract: _____

_____

_____

Are you in compliance with all applicable EEO requirements? ☐ Yes ☐ No

(If no, please attach summary of details on a separate sheet.))

(Optional) Minority Business Reporting Information:

Owner's Race: _____

Owner's Ethnicity: _____

Owner's Gender: _____

Are you a Section 3 business? (see below) □ Yes □ No

Section 3 Business Concerns:

a) Businesses that are 51 percent or more owned by Section 3 residents;

b) Businesses whose permanent, full-time employees include persons, at least 30 percent of whom are currently Section 3 residents, or within three years of the date of first employment with the firm were Section 3 residents;

c) Businesses that provide evidence of a commitment to subcontract in excess of 25 percent of the dollar amount of all subcontracts to be awarded to businesses that meet the qualifications described above; or

d) Businesses located within the City/County's jurisdiction that identifies themselves as Section 3 Business Concerns because they provide economic opportunities for low- and very low-income persons.

Bank References

Address: _____ Contact Name: _____

City & State: _____Zip: _____Phone Number: _____

Credit available: $ _____

Has the firm or predecessor firm been involved in a bankruptcy or reorganization? ☐ Yes ☐ No

(If yes, please attach summary of details on a separate sheet.)

List on a sheet attached hereto all judgements, claims, arbitration proceedings, or suits pending or outstanding against bidder over the last five (5) years with amount of claim and brief description.

List on a sheet attached hereto all lawsuits or requested arbitration with regard to construction contracts which bidder has initiated within the last five (5) years and brief explanation of claim and outcome.

Attach resume(s) for the principal member(s) of your organization, including the officers as well as the proposed superintendent for the project.

Signed this _____ day of _____, 20____.

_____

Signature

_____

Printed Name and Title

_____

Company Name

Notary Statement:

_____. being duly sworn, says that he/she is the _____Position/Title _____of_____ (Firm Name), and hereby swears that the answers to the foregoing questions and all statements therein contained are true and correct. He/she hereby authorizes and requests any person, firm, or corporation to furnish any information requested City/County of _____ in verification of the recitals comprising this Statement of Bidder's Qualifications.

Subscribed and sworn before me this _____day of _____, 20____.

Notary Public

_____

Signature

_____

Printed Name

My Commission Expires: _____,

The penalty for making false statements is prescribed in the U. S. Criminal Code, 18 U.S.C. 1001.

CONFLICT OF INTEREST QUESTIONNAIRE

For vendor doing business with local governmental entity

FORM CIQ

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

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

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

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

OFFICE USE ONLY

Date Received

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

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

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

_____

Name of Officer

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

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

☐ Yes ☐ No

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

☐ Yes ☐ No

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

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

7

_____ _____

Signature of vendor doing business with the governmental entity Date

CONFLICT OF INTEREST QUESTIONNAIRE

For vendor doing business with local governmental entity

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

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

(A) a transaction that is subject to rate or fee regulation by a federal, state, or local governmental entity or an agency of a federal, state, or local governmental entity;

(B) a transaction conducted at a price and subject to terms available to the public; or

(C) a purchase or lease of goods or services from a person that is chartered by a state or federal agency and that is subject to regular examination by, and reporting to, that agency.

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

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

***

(2) the vendor:

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

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

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

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

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

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

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

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

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

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

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

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

(1) the date that the vendor:

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

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

(2) the date the vendor becomes aware:

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

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

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

NONCOLLUSION AFFIDAVIT OF PRIME BIDDER

State of Texas)

County of _____)

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

(1) He/She is _____ of _____, the Bidder that has submitted the attached Bid;

(2) He/She is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;

(3) Such Bid is genuine and is not a collusive or sham Bid;

(4) Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with another Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix an overhead, profit or cost element of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the _____ _____ (Local Public Agency) or any person interested in the proposed Contract; and

(5) The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including this affiant.

(Signed) _____

_____

Title

Subscribed and sworn to me this _____ day of _____.

By: _____

Notary Public

My commission expires _____

CONTRACTOR CERTIFICATIONS

U.S. Department of Housing and Urban Development

CERTIFICATION OF BIDDER REGARDING CIVIL RIGHTS LAWS AND REGULATIONS

INSTRUCTIONS

CERTIFICATION OF BIDDER REGARDING Executive Order 11246 and Federal Laws Requiring Federal Contractor to adopt and abide by equal employment opportunity and affirmative action in their hiring, firing, and promotion practices. This includes practices related to race, color, gender, religion, national origin, disability, and veterans' rights.

NAME AND ADDRESS OF BIDDER (include ZIP Code)

CERTIFICATION BY BIDDER

Bidder has participated in a previous contract or subcontract subject to Civil Rights Laws and Regulations.

☐ Yes ☐ No

The undersigned hereby certifies that:

☐ The Provision of Local Training, Employment, and Business Opportunities clause (Section 3 provision) is included in the Contract. A written Section 3 plan (Local Opportunity Plan) was prepared and submitted as part of the bid proceedings.. ☐ The Equal Opportunity clause is included in the Contract (if bid equals or exceeds $10,000).
Have you ever been or are you being considered for sanction due to violation of Executive Order 11246, as amended? ☐ Yes ☐ No
NAME AND TITLE OF SIGNER (Please type)
SIGNATURE DATE

CONTRACTOR'S CERTIFICATION of RECOVERED MATERIAL

ACKNOWLEDGEMENT

I, _____(Principal's Name)___ of _____(Company Name)_____, (hereinafter called "Contractor"), acknowledge the recovered material bidding requirements found in 2 CFR 200.322 that requires the Contractor to procure those items designated in the guidelines of the Environmental Protection Agency (EPA) at 40 CFR 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition.

I also acknowledge that this requirement shall apply to items purchased (1) where the Contractor purchases in excess of $10,000 of the item under this contract; or (2) where during the preceding fiscal year, the value of the quantity acquired was in excess of $10,000.

Finally, I acknowledge the attached list of recovered materials included in the bid documents.

(For up-to-date listing, please go to https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program#directory)

_____
Printed Name and Title

_____
Signature

_____
Date

USE OF RECOVERED MATERIAL

Please check one:

- ☐ Recovered materials are included in this bid:
  Materials included_____
- ☐ Recovered materials are not reasonably available in a reasonable period of time.
- ☐ Recovered materials fail to meet reasonable performance standards, which are determined on the basis of the guidelines of the National Institute of Standards and Technology, if applicable.
- ☐ Recovered materials are only available at an unreasonable price.

_____
Printed Name and Title

_____
Signature

_____
Date

CONTRACTOR'S LOCAL OPPORTUNITY PLAN

_____ agrees to implement the following specific affirmative action steps directed at increasing the utilization of lower income residents and businesses within the (City/County) of _____.

A. To ascertain from the City/County's CDBG program official the exact boundaries of the project area and where advantageous, seek the assistance of local officials in preparing and implementing the affirmative action plan.

B. To attempt to recruit from within the city the necessary number of lower income residents through: local advertising media, signs placed at the proposed site for the project, and community organizations and public or private institutions operating within and servicing the project area such as Service Employment and Redevelopment (SER), Opportunities Industrialization Center (OIC), Urban League, Concentrated Employment Program, Hometown Plan, or the U.S. Employment Service.

C. To maintain a list of all lower income residents who have applied either on their own or on referral from any source, and to employ such persons, if otherwise eligible and if a vacancy exists.

D. To insert this plan in all bid documents and to require all bidders on subcontracts to submit an affirmative action plan including utilization goals and the specific steps planned to accomplish these goals.

E. To ensure that subcontracts (greater than $10,000), which are typically let on a negotiated rather than a bid basis in areas other than the covered project area, are also let on a negotiated basis, whenever feasible, in a covered project area.

F. To formally contact unions, subcontractors, and trade associations to secure their cooperation in this effort.

G. To ensure that all appropriate project area business concerns are notified of pending sub-contractual opportunities.

H. To maintain records, including copies of correspondence, memoranda, etc., which document that all of the above affirmative action steps have been taken.

I. To appoint or recruit an executive official of the company or agency as Equal Opportunity Officer to coordinate the implementation of this plan.

J. To maintain records concerning the amount and number of contracts, subcontracts, and purchases which contribute to objectives.

K. To maintain records of all projected work force needs for all phases of the project by occupation, trade, skill level, and number of positions and to update these projections based on the extent to which hiring meets these Local Opportunity objectives.

As officers and representatives of_____, we the undersigned have read and fully agree to this Plan and the City/County's Section 3 Plan, and become a party to the full implementation of the program and its provisions.

_____

Signature

_____

Printed Name

_____

Title

_____

Date

CERTIFICATION REGARDING LOBBYING
COMPLIANT WITH APPENDIX A TO 24 C.F.R. PART 87*

(To be submitted with each bid or offer exceeding $100,000)

Certification for Contracts, Grants, Loans, and Cooperative Agreements:

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, ‘‘Disclosure Form to Report Lobbying,’’ in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

Statement for Loan Guarantees and Loan Insurance:

The undersigned states, to the best of his or her knowledge and belief, that: If any funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this commitment providing for the United States to insure or guarantee a loan, the undersigned shall complete and submit Standard Form-LLL, ‘‘Disclosure Form to Report Lobbying,’’ in accordance with its instructions. Submission of this statement is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required statement shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

As the duly authorized representative of the Contractor, I hereby certify that the applicant will comply with the above applicable certification.

_____

Signature of Contractor’s Authorized Official

_____

Printed Name and Title of Contractor’s Authorized Official

_____

Date

*24 C.F.R. 87 App. A, available at https://www.gpo.gov/fdsys/granule/CFR-2011-title24-vol1/CFR-2011-title24-vol1-part87-appA. Published Apr. 1, 2011. Accessed Aug. 1, 2018.

INSTRUCTIONS FOR COMPLETION OF SF-LLL, DISCLOSURE OF LOBBYING ACTIVITIES

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material change to a previous filing, pursuant to title 31 U.S.C. section 1352. The filing of a form is required for each payment or agreement to make payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a covered Federal action. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.
2. Identify the status of the covered Federal action.
3. Identify the appropriate classification of this report. If this is a followup report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last previously submitted report by this reporting entity for this covered Federal action.
4. Enter the full name, address, city, State and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime or subaward recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.
5. If the organization filing the report in item 4 checks “Subawardee,” then enter the full name, address, city, State and zip code of the prime Federal recipient. Include Congressional District, if known.
6. Enter the name of the federal agency making the award or loan commitment. Include at least one organizational level below agency name, if known. For example, Department of Transportation, United States Coast Guard.
7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans, and loan commitments.
8. Enter the most appropriate Federal identifying number available for the Federal action identified in item 1 (e.g., Request for Proposal (RFP) number; Invitations for Bid (IFB) number; grant announcement number; the contract, grant, or loan award number; the application/proposal control number assigned by the Federal agency). Included prefixes, e.g., “RFP-DE-90-001.”
9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitment for the prime entity identified in item 4 or 5.
10. (a) Enter the full name, address, city, State and zip code of the lobbying registrant under the Lobbying Disclosure Act of 1995 engaged by the reporting entity identified in item 4 to influence the covered Federal action.

    (b) Enter the full names of the individual(s) performing services, and include full address if different from 10(a). Enter Last Name, First Name, and Middle Initial (MI).
11. The certifying official shall sign and date the form, print his/her name, title, and telephone number.

According to the Paperwork Reduction Act, as amended, no persons are required to respond to a collection of information unless it displays a valid OMB control Number. The valid OMB control number for this information collection is OMB No. 4040-0013. Public reporting burden for this collection of information is estimated to average 10 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (4040-0013), Washington, DC 20503

Approved by OMB
4040-0013

Disclosure of Lobbying Activities

Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352

(See reverse for public burden disclosure)

1. Type of Federal Action: a. contract ____ b. grant c. cooperative agreement d. loan e. loan guarantee f. loan insurance	**2. Status of Federal Action:** a. bid/offer/application _____ b. initial award c. post-award	**3. Report Type:** a. initial filing _____ b. material change **For material change only:** Year _____ quarter _____ Date of last report_____

4. Name and Address of Reporting Entity: ____ Prime _____ Subawardee Tier_____, if Known: **Congressional District,** *if known*:	**5. If Reporting Entity in No. 4 is Subawardee,** Enter Name and Address of Prime: **Congressional District,** *if known*:
6. Federal Department/Agency:	**7. Federal Program Name/Description:** CFDA Number, *if applicable*: _____
8. **Federal Action Number,** *if known:*	9. **Award Amount**, *if known:* **$**
10. a. Name and Address of Lobbying Registrant *(if individual, last name, first name, MI):*	**b. Individuals Performing Services** *(including address if different from No. 10a)* *(last name, first name, MI):*
11. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or	**Signature: _____**

entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.	**Print Name: _____** **Title: _____** **Telephone No.: _____ Date: _____**
Federal Use Only	**Authorized for Local Reproduction** **Standard Form - LLL (Rev. 7-97)**

(a) The application shall be in writing and shall be addressed to the Secretary of Labor.

(b) The application need not identify the contract or contracts under which the work in question is to be performed. Permission will be given for deductions on all current and future contracts of the applicant for a period of 1 year. A renewal of permission to make such payroll deduction will be granted upon the submission of an application which makes reference to the original application, recites the date of the Secretary of Labor's approval of such deductions, states affirmatively that there is continued compliance with the standards set forth in the provisions of §3.6, and specifies any conditions which have changed in regard to the payroll deductions.

(c) The application shall state affirmatively that there is compliance with the standards set forth in the provisions of §3.6. The affirmation shall be accompanied by a full statement of the facts indicating such compliance.

(d) The application shall include a description of the proposed deduction, the purpose to be served thereby, and the classes of laborers or mechanics from whose wages the proposed deduction would be made.

(e) The application shall state the name and business of any third person to whom any funds obtained from the proposed deductions are to be transmitted and the affiliation of such person, if any, with the applicant.

[29 FR 97, Jan. 4, 1964, as amended at 36 FR 9771, May 28, 1971]

§3.8 Action by the Secretary of Labor upon applications.

The Secretary of Labor shall decide whether or not the requested deduction is permissible under provisions of §3.6; and shall notify the applicant in writing of his decision.

§3.9 Prohibited payroll deductions.

Deductions not elsewhere provided for by this part and which are not found to be permissible under §3.6 are prohibited.

§3.10 Methods of payment of wages.

The payment of wages shall be by cash, negotiable instruments payable on demand, or the additional forms of compensation for which deductions are permissible under this part. No other methods of payment shall be recognized on work subject to the Copeland Act.

§3.11 Regulations part of contract.

All contracts made with respect to the construction, prosecution, completion, or repair of any public building or public work or building or work financed in whole or in part by loans or grants from the United States covered by the regulations in this part shall expressly bind the contractor or subcontractor to comply with such of the regulations in this part as may be applicable. In this regard, see §5.5(a) of this subtitle.

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM

CONTRACTOR'S CERTIFICATION

CONCERNING LABOR STANDARDS AND PREVAILING WAGE REQUIREMENTS

TO (appropriate recipient)	DATE
	PROJECT NUMBER (if any)
C/O	PROJECT NAME

1. The undersigned, having executed a contract with _____ _____ for the construction of the above-identified project, acknowledges that:

   (a) The Labor Standards provisions are included in the aforesaid contract,

   (b) Correction of any infractions of the aforesaid conditions, including infractions by any subcontractors and any lower tier subcontractors, is Contractor's responsibility.

2. Certifies that:

   (a) Neither Contractor nor any firm, partnership or association in which it has substantial interest is designated as an ineligible contractor by the Comptroller General of the United States pursuant to Section 5.6(b) of the Regulations of the Secretary of Labor, Part 5 (29 CFR, Part 5) or pursuant to Section 3(a) of the Davis-Bacon Act, as amended.

   (b) No part of the aforementioned contract has been or will be subcontracted to any subcontractor if such subcontractor or any firm, corporation, partnership or association in which such subcontractor has a substantial interest is designated as an ineligible contractor pursuant to any of the aforementioned regulatory or statutory provisions.

3. Contractor agrees to obtain and forward to the aforementioned recipient within ten days after the execution of any subcontract, including those executed by subcontractors and any lower tier subcontractors, a Subcontractor's Certification Concerning Labor Standards and Prevailing Wage Requirements executed by the subcontractors.

4. Certifies that:

   (a) The legal name and the business address of the undersigned are:

   (b) The undersigned is (choose one):

(1) A SINGLE PROPRIETORSHIP	(3) A CORPORATION ORGANIZED IN THE STATE OF
(2) A PARTNERSHIP	(4) OTHER ORGANIZATION (Describe)

(c) The name, title and address of the owner, partners or officers of the undersigned are:

NAME	TITLE	ADDRESS

(d) The names and addresses of all other persons having a substantial interest in the undersigned, and the nature of the interest are:

NAME	ADDRESS	NATURE OF INTEREST

(e) The names, addresses and trade classifications of all other building construction contractors in which the undersigned has a substantial interest are:

NAME	ADDRESS	TRADE CLASSIFICATION

		(Contractor)
Date		
	By	

SECTION 504 CERTIFICATION

POLICY OF NONDISCRIMINATION ON THE BASIS OF DISABILITY

The _____ does not discriminate on the basis of disability status in the admission or access to, or treatment or employment in, its federally assisted programs or activities.

(Name) _____

(Address) _____

_____

City State Zip

Telephone Number ( ) _____ - _____ Voice

( ) _____ - _____ TDD

_____has been designated to coordinate compliance with the nondiscrimination requirements contained in the Department of Housing and Urban Development's (HUD) regulations implementing Section 504 (24 CFR Part 8. dated June 2, 1988).

CHILD SUPPORT STATEMENT FOR NEGOTIATED CONTRACTS AND GRANTS

Under Section 231.006, Family Code, the vendor or applicant certifies that the individual or business entity named in this contract, bid, or application is eligible to receive the specified grant, loan, or payment and acknowledges that this contract may be terminated and payment may be withheld if this certification is inaccurate.

Section 231.006, Family Code, specifies that a child support obligor who is more than 30 days delinquent in paying child support and a business entity in which the obligor is a sole proprietor, partner, shareholder, or owner with an ownership interest of at least 25% is not eligible to receive payments from state funds under a contract to provide property, materials, or services; or receive a state-funded grant or loan.

List below the name and ownership percentage of the individual or sole proprietor and each partner, shareholder, or owner with an ownership interest of at least 25% of the business entity submitting the bid or application.

NAME	**OWNERSHIP BY %**

A child support obligor or business entity ineligible to receive payments described above remains ineligible until all arrearage have been paid or the obligor is in compliance with a written repayment agreement or court order as to any existing delinquency.

The undersigned proposer certifies that he or she, is the proposing individual, or the sole proprietor of the proposing business, and is eligible under Section 231.006 of the Texas Family Code, to receive the payments of State funds which may be disbursed in connection with a contract arising from this solicitation, The undersigned each further acknowledges that a contract resulting from this solicitation may be terminated and payment may be withheld if the certification provided herein is found to be inaccurate.

Signature – Company Official	Printed/Type Firm Name
Printed/Typed Name and Title	Date

Contractor's Certification of Efforts to Fully Comply with Employment and Training Provisions of Section 3

Project Name: _____

Contract Number: _____

Contractor: _____

The undersigned contractor hereby certifies that it has made every effort within its disposal to comply with the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, and implementing regulations. The contractor certifies that it has:

1. Notified Section 3 workers and targeted Section 3 workers of employment opportunities.
2. Advertised available positions in a manner designed to reach Section 3 workers.
3. Maintained records of all employment and training opportunities offered.
4. Considered qualified Section 3 workers for available positions.
5. Provided documentation of recruiting and outreach efforts.
6. Maintained documentation supporting compliance with Section 3 requirements.

The contractor further certifies that the information provided is true and correct to the best of its knowledge and that all supporting documentation is available for review upon request.

Contractor Representative: _____

Title: _____

Signature: _____

Date: _____

Instructions for Proposed Contracts Breakdown and Estimated Project Workforce Breakdown

Proposed Contracts Breakdown

Type of Contracts – list all construction, materials, or other types of subcontracts (for example: electrical, plumbing, concrete, boring, etc.)

No. of Contracts – Number of contracts under this category

Approximate Total Dollar Amount – Total amount of each contract

Estimated No. to Local Business – Number of contracts awarded to local businesses and Section 3 businesses

Estimated $ Amount to Local Business - How many dollars will be spent locally for each type of contract? For example: will you hire any local employees or subcontractors?

Estimated Project Workforce Breakdown

Work Classifications – Classification of project employees as defined on Wage Rate

Total Estimated Positions – List the number employees for each work classification will you need on this project

Number of Positions Currently Filled – List the number of estimated positions you currently have filled

Number of Positions Not Filled – List the number of estimated positions you currently do not have filled

Number of Positions to Fill with Low to Moderate Income (Section 3) Residents – List the number of local residents earning low to moderate incomes that you plan to employ to fill the estimated positions not filled

PROPOSED CONTRACTS BREAKDOWN

Type of Contracts	No. of Contracts	Approx. Total Dollar Amount	Estimated No. to local Business	Estimated $ Amoun Local Business

ESTIMATED PROJECT WORKFORCE BREAKDOWN

Work Classifications	Total Estimated Positions	No. of Positions Currently Filled	No. of Positions not Filled	No. of Positions to fill with LMI Residents (Section 3)

Totals				

CONTRACTOR'S FINAL PAYMENT AFFIDAVIT

City/County:			**CDBG-DR No:**	
Contractor:			**Date:**	

BEFORE ME, THE UNDERSIGNED AUTHORITY, on this day personally appeared _____ _____, who being duly sworn, on oath, says that he is a duly authorized representative of _____ _____; Contractor, and that all terms of the Contract for the completion of certain public works described as _____ _____ _____; City/County of _____ _____, Texas have been satisfactorily completed and that ALL sums of money for payrolls, bills for material and equipment, and other indebtedness connected with the Work for the Owner or its property might in any way be responsible to the best of my knowledge and belief, have been paid or will be paid or otherwise satisfied within thirty days after receipt of final payment from the Owner, or within the period of time required by Article 601f, Vernon's Civil Statutes. Payments not made in full at the time of this affidavit are listed below.

FINAL PAYMENTS pending as of this date hereof are:		**None Pending**			**As Listed Below**

Individual or Co. Name	**Mailing Address**	**Amount Owed**

Signature
Title

Affidavit must be signed by an individual owner or partner in partnership, or by a person authorized by by-laws or Board of Directors to sign for a corporation. If Contractor is a joint venture or partnership of individuals, either may sign, but if a joint venture in which a corporation is a party, separate affidavits must be executed by each corporation and by each individual owner or partnership. In the event subcontractors, laborers, or material suppliers have not been paid in full, the Contractor shall list here on the amount owed and the name and address of each subcontractor, laborer, or material supplier to whom such payment is owed.

Sworn and Subscribed before me this, the _____ day of _____, 20_____.

	(SEAL)

Notary Public in and for _____ County, Texas

Grantee/Subrecipient: _____
Include this document in all applicable bid packets.

Texas General Land Office
Community Development Block Grant (CDBG)
Disaster Recovery Program

Contractor Certification of Efforts to Fully Comply with Employment and Training Provisions of Section 3

Economic Opportunities for Low and Very Low-Income Persons

THE BIDDER REPRESENTS AND CERTIFIES AS PART OF ITS BID/OFFER THAT IT:

☐ Is a Section 3 Business Concern. A Section 3 Business Concern means a business concern:
1. That is 51% or more owned by Section 3 Resident(s); or
2. Whose permanent, full-time employees include persons, at least 30% of whom are currently Section 3 Residents, or
3. That provides evidence of a commitment to subcontract in excess of 25% of the dollar value of all subcontracts to be awarded to Section 3 Business Concerns, that meet the qualifications set forth in paragraphs 1 or 2 herein.

☐ Is **NOT** a Section 3 Business Concern, but who has and will continue to seek compliance with Section 3 by certifying the following efforts to be undertaken.

EFFORTS TO AWARD SUBCONTRACTOR TO SECTION 3 CONCERNS
(Check ALL that apply)

☐ By contacting business assistance agencies, minority contractors associations and community organizations to inform them of the contracting opportunities and requesting their assistance in identifying Section 3 businesses which may solicit bids for a portion of the work.

☐ By advertising contracting opportunities by posting notices, which provide general information about the work to be contracted and where to obtain additional information, in the common areas of the applicable development(s) owned and managed by the Housing Authority.

☐ By providing written notice to all known Section 3 Business Concerns of contracting opportunities. This notice should be in sufficient time to allow the Section 3 Business Concerns to respond to bid invitations

☐ By following up with Section 3 Business Concerns that have expressed interest in the contracting opportunities.

☐ By coordinating meetings at which Section 3 Business Concerns could be informed of specific elements of the work for which subcontract bids are being sought.

☐ By conducting workshops on contracting procedures and specific contracting opportunities in a timely manner so that Section 3 Business Concerns can take advantage of contracting opportunities.

☐ By advising Section Business Concerns as to where they seek assistance to overcome barriers such as inability to obtain bonding, lines of credit, financing, or insurance and aiding Section 3 Businesses in qualifying for such bonding , financing, insurance, etc....

☐ Where appropriate, by breaking out contract work into economically feasible units to facilitate participation by Section 3 businesses.

☐ By developing and using a list of eligible Section 3 Business Concerns.

☐ By actively supporting and undertaking joint ventures with Section 3 Businesses.

EFFORTS TO PROVIDE TRAINING AND EMPLOYMENT TO SECTION 3 RESIDENTS

☐ By entering into a "first source" hiring agreements with organizations representing Section 3 Residents.

☐ By establishing training programs, which are consistent with the requirements of the Department of Labor, specifically for Section 3 Residents in the building trades.

☐ By advertising employment and training positions to dwelling units occupied by Category 1 and 2 residents.

☐ By contacting resident councils and other resident organizations in the affected housing development to request assistance in notifying residents of the training and employment positions to be filled.

☐ By arranging interviews and conducting interviews on the job site.

☐ By undertaking such continued job-training efforts as may be necessary to ensure the continued employment of Section 3 Residents previously hired for employment opportunities.

Contractor Name/Business Name: _____

Signature Field _____ **Date/Time Field** _____

Texas General Land Office
Community Development Block Grant (CDBG)
Disaster Recovery Program

CERTIFICATION FOR BUSINESS CONCERNS
Seeking Section 3 Preference in Contracting and Demonstration of Capability

Economic Opportunities for Low and Very Low-Income Persons

Grantee/Subrecipient:	Contract Number:	Date:

CONTRACTOR INFORMATION

Name of Business

Address of Business

Type of Business: ☐ Corporation ☐ Partnership ☐ Non-Profit
☐ Sole Proprietorship ☐ Joint Venture Consortium

Attach the following documentation as evidence of Section 3 eligible status:
(Definition of "Section 3 Business Concern" in 24 CFR 135 describes the three alternative qualifications.)

For Business claiming status as a Section 3 resident-owned enterprise:

☐ Copy of resident lease
☐ Copy of evidence of participation in a public assistance program
☐ Copy of receipt of public assistance
☐ Other evidence

For business entity as applicable:

☐ Copy of Articles of Incorporation
☐ Assumed Business Name Certificate
☐ List of owners/stockholders and % ownership of each appointed officers
☐ Organization chart with names and titles and brief function statement
☐ Certificate of Good Standing
☐ Partnership Agreement
☐ Corporation Annual Report
☐ Latest Board minutes
☐ Additional documentation

For business entity claiming Section 3 status by subcontracting 25 percent of the dollar awarded to qualified Section 3 business(es):

☐ List of subcontracted Section 3 business(es) and subcontract amount

For business claiming Section 3 status, by claiming at least 30 percent of their workforce are currently Section 3 residents or were Section 3 eligible residents within 3 years of date of first employment with the business:

☐ List of all current full-time employees
☐ PHA/IHA Residential lease less than 3 years from day of employment
☐ List of employees claiming Section 3 status
☐ Other evidence of Section 3 status less than 3 years from date of employment

Evidence of ability to perform successfully under the terms and conditions of the proposed contract:

☐ Current financial statement
☐ List of owned equipment
☐ List of all contracts for the past two years
☐ Statement of ability to comply with public policy

Authorized Name and Signature

Date

Attested By:

(Corporate Seal)

GLO SIGNAGE REQUIREMENTS

All signs shall be placed in a prominent, visible public location at the construction site, and legible from at least three (3) feet distance.

Permanent signage is required on any public building or facility funded under this Contract. Please refer to the plans and specifications for further details.

For other construction projects (e.g., water transmission lines, sewer collection lines, drainage, roadways, housing rehabilitation) funded under this Contract, temporary signage shall be placed in a prominent location at the construction project site or along a major thoroughfare within the locality.

All signage required shall contain the following:

"This project is funded by the Texas General Land Office of the State of Texas to provide for mitigation activities to reduce disaster risks in communities impacted by Hurricane Harvey. The funds have been allocated by the United States Department of Housing and Urban Development through the Community Development Block Grant – Mitigation Program."

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

Section 3

Economic Opportunity

A Piece of the American Dream

This project is federally funded and Section 3 compliance and reporting applies to all executed prime or sub contracts over $100,000.

About Section 3

Section 3 of the Housing and Urban Development Act of 1968 (12 U.S.C. 1701u) (as amended), requires that economic opportunities generated by certain HUD financial assistance for housing (including Public and Indian Housing) and community development programs shall, to the greatest extent feasible, be given to low and very low-income persons, particularly those who are recipients of government assistance for housing, and to businesses that provide economic opportunities for these persons.

Other HUD programs covered by Section 3 (to distinguish between HUD Public and Indian housing programs) are those that provide housing or community development assistance for housing rehabilitation, housing construction, or other public construction project.

Who are Section 3 residents?

Public housing residents including persons with disabilities. Low and very

low income persons who live in the area where a HUD assisted projected is located.

What is a Section 3 Business?

A section 3 business is one:

That is owned by Section 3 residents
Employs Section 3 residents or;

Subcontracts with businesses that provide opportunities to low and very low income persons.

Who receives Economic Opportunities under Section 3?

For training and employment:

- ✓ persons in public and assisted housing;
- ✓ persons in the affected project neighborhood;
- ✓ participants in HUD Youth-build programs;
- ✓ homeless persons.

For contracting:

- ✓ businesses which fit the definition of a Section 3 business.

What am I required to do as a contractor?

- ✓ Submit monthly new hires report (pg7-8)
- ✓ Post any job vacancies at www.workintexas.com
- ✓ Keep a log of all applicants and indicate why Section 3 Residents who applied were not hired
- ✓ Retain copies of any employment applications completed by public housing, Section 8, voucher holders, Section 3 Residents

How to Post Job Vacancies

As required by the GLO Section 3 Policy, all Grantees and contractors receiving DR funding **must** post all job vacancies with the state's free job matching system – WorkInTexas.com. There are two ways to do this. Self-register with an employer account and post jobs directly online or contact your local Workforce Solutions Office. Staff is available to assist with account registration and/or can post jobs on your behalf at WorkIntexas.com. **The job title and job description must include the word SEC3.**

More ways to find Section 3 Applicants

- ✓ Advertising in other publications such as newspapers and websites
- ✓ Placing posters in prominent places in target areas
- ✓ Distributing flyers to the local Public Housing Authority

Where can I find my local Worforce Solution Center?

You may search for one here:
http://www.twc.state.tx.us/dirs/wdas/directory-offices-services.html?mid=0.07262226541895678

HUD Compliance and Monitoring?

HUD monitors the performance of recipients and contractors. HUD examines employment and contract records for evidence of actions taken to train and employ Section 3 residents and to award contracts to Section 3 businesses. HUD provides technical assistance to recipients and contractors in order to obtain compliance with Section 3 requirements.

What if it appears that an entity is not complying?

There is a complaint process. Section 3 residents and business concerns may file complaints if they think a violation of Section 3 requirements has occurred where a HUD-funded project is planned or underway. Complaints will be investigated; if appropriate, voluntary resolutions will be sought. There are appeal rights to the Secretary. Section
3 residents and businesses may also seek judicial relief.

How can Section 3 businesses or residents complain about a violation of Section 3 requirements?

By filing a complaint in writing to the local HUD FHEO Office or to:

The Assistant Secretary for Fair Housing and Equal Opportunity
U.S. Department of Housing and Urban Development
451 Seventh Street, SW, Room 5100
Washington, DC 20410-2000
1-800-669-9777
1-800-927-9276 (TTY)
www.hud.gov www.espanol.hud.gov

A written compliant should contain:

1. Name and address of the person filing the complaint;
2. Name and address of subject of complaint (HUD recipient or contractor);
3. Description of acts or omissions in alleged violation of Section3;
4. Statement of corrective actions sought

How can individuals and businesses find out more about Section 3?

Contact GrantWorks at 512-420-0303 ext.334 or Fair Housing and Equal Opportunity representative at your nearest HUD Office.

[Code of Federal Regulations]
[Title 24, Volume 1]
[Revised as of April 1, 2003]
From the U.S. Government Printing Office via GPO Access
[CITE: 24CFR135.92]
[Page 704-707]

TITLE 24--HOUSING AND URBAN DEVELOPMENT
CHAPTER I--OFFICE OF ASSISTANT SECRETARY FOR EQUAL OPPORTUNITY, DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
PART 135--ECONOMIC OPPORTUNITIES FOR LOW- and VERY LOW-INCOME PERSONS

Table of Contents

Appendix to Part 135

I. EXAMPLES OF EFFORTS TO OFFER TRAINING AND EMPLOYMENT OPPORTUNITIES TO SECTION 3 RESIDENTS

(1) Entering into ``first source'' hiring agreements with organizations representing Section 3 residents.
(2) Sponsoring a HUD-certified ``Step-Up'' employment and training program for section 3 residents.
(3) Establishing training programs, which are consistent with the requirements of the Department of Labor, for public and Indian housing residents and other section 3 residents in the building trades.
(4) Advertising the training and employment positions by distributing flyers (which identify the positions to be filled, the qualifications required, and where to obtain additional information about the application process) to every occupied dwelling unit in the housing development or developments where category 1 or category 2 persons (as these terms are defined in Sec. 135.34) reside.
(5) Advertising the training and employment positions by posting flyers (which identify the positions to be filled, the qualifications required, and where to obtain additional information about the application process) in the common areas or other prominent areas of the housing development or developments. For HAs, post such advertising in the housing development or developments where category 1 or category 2 persons reside; for all other recipients, post such advertising in the housing development or developments and transitional housing in the neighborhood or service area of the section 3 covered project.
(6) Contacting resident councils, resident management corporations, or other resident organizations, where they exist, in the housing development or developments where category 1 or category 2 persons reside, and community organizations in HUD assisted neighborhoods, to request the assistance of these organizations in notifying residents of the training and employment positions to be filled.

(7) Sponsoring (scheduling, advertising, financing or providing in-kind services) a job informational meeting to be conducted by an HA or contractor representative or representatives at a location in the housing development or developments where category 1 or category 2 persons reside or in the neighborhood or service area of the section 3 covered project.

(8) Arranging assistance in conducting job interviews and completing job applications for residents of the housing development or developments where category 1 or category 2 persons reside and in the neighborhood or service area in which a section 3 project is located.

[[Page 705]]

(9) Arranging for a location in the housing development or developments where category 1 persons reside, or the neighborhood or service area of the project, where job applications may be delivered to and collected by a recipient or contractor representative or representatives.

(10) Conducting job interviews at the housing development or developments where category 1 or category 2 persons reside, or at a location within the neighborhood or service area of the section 3 covered project.

(11) Contacting agencies administering HUD Youthbuild programs, and requesting their assistance in recruiting HUD Youthbuild program participants for the HA's or contractor's training and employment positions.

(12) Consulting with State and local agencies administering training programs funded through JTPA or JOBS, probation and parole agencies, unemployment compensation programs, community organizations and other officials or organizations to assist with recruiting Section 3 residents for the HA's or contractor's training and employment positions.

(13) Advertising the jobs to be filled through the local media, such as community television networks, newspapers of general circulation, and radio advertising.

(14) Employing a job coordinator, or contracting with a business concern that is licensed in the field of job placement (preferably one of the section 3 business concerns identified in part 135), that will undertake, on behalf of the HA, other recipient or contractor, the efforts to match eligible and qualified section 3 residents with the training and employment positions that the HA or contractor intends to fill.

(15) For an HA, employing section 3 residents directly on either a permanent or a temporary basis to perform work generated by section 3 assistance. (This type of employment is referred to as ``force account labor'' in HUD's Indian housing regulations. See 24 CFR 905.102, and Sec. 905.201(a)(6).)

(16) Where there are more qualified section 3 residents than there are positions to be filled, maintaining a file of eligible qualified section 3 residents for future employment positions.

(17) Undertaking job counseling, education and related programs in association with local educational institutions.

(18) Undertaking such continued job training efforts as may be necessary to ensure the continued employment of section 3 residents previously hired for employment opportunities.

(19) After selection of bidders but prior to execution of contracts, incorporating into the contract a negotiated provision for a specific number of public housing or other section 3 residents to be trained or employed on the section 3 covered assistance.

(20) Coordinating plans and implementation of economic development (e.g., job training and preparation, business development assistance for residents) with the planning for housing and community development.

Texas General Land Office
Community Development Block Grant (CDBG)
Disaster Recovery Program

NEW HIRES SECTION 3
MONTHLY COMPLIANCE REPORT

Reporting Month:

Economic Opportunities for Low and Very Low-Income Persons

This form is distributed to the General Contractor (GC) at the Pre-Construction Meeting. GC is also required to provide this form to any subcontractor firms that they anticipate hiring for this project.

CONTRACTOR INFORMATION

Name of Business:

Address of Business:

Authorized Representative for this contract:

Authorized Signatory:

ADDITIONALLY, PLEASE REVIEW AND COMPLY WITH STEPS 1 - 3 BELOW:

1. You must **sign and date** this form for the each applicable reporting month in connection with awarded project and deliver to:

2. When you **hire** a Section 3 resident in connection with this project, you must also complete this form and submit it to the Section 3 Coordinator identified above. Even if there were no **new hires** this form **must be completed and submitted to the Section 3 Coordinator identified above.**

☐ I have not hired any new employees during the reporting Month specified.

I have hired ____ Section 3 employess and/or ____ non-Section 3 employees during the reporting month shown here.

The following is a list of the new hires and the trades:

	New Hire Name	Job Category/Trade	Full-time? Yes or No
1.			
2.			
3.			
4.			

I have taken one or more of the following recruitment steps to hire a Section 3 Resident with the highest training and employment priority ranking. **Provide a brief description of actions taken:**

I have taken steps to find a Section 3 Resident in the applicable targeted areas where the project(s)/assistance will take place. **List areas:**

☐ Placed signs or posters at prominent places in each of the above listed areas. *Photographs were taken to document this action.*

I have advertised to fill vacancy(ies) at the site(s), where work is taking place, in connection with this project. **List advertisements (name publication, e.g. Work in Texas, Houston Chronicle, and/or website(s):**

☐ Distributed employment flyers to the administrative office of the local Public Housing Authority.

☐ Provided notice of positions available to the Texas Workforce Commission for potential applicants. *Provide copy of notice.*

☐ Contacted employment referrals or Youthbuild Program referrals. **List contacts:**

☐ Contacted with applicable parties to ensure that any HUD Youthbuild programs currently operating in the project(s) area/ assistance will take place.

☐ Kept a log of all applicants and indicate the reasons why Section 3 Residents who applied were not hired.

☐ Retained copies of any employment applications completed by public housing, Section 8 certificate or voucher holders or other Section 3 Residents.

☐ Sent a notice about Section 3 training and employment requirements and opportunities to labor organizations or to worker representatives with whom our firm has a collective bargaining or other agreement.

3. Verification

☐ I have attached proof of all checked items.

Authorized Name and Signature

Date/Time Field

Attested By:

Text

Title 29: Labor

PART 3—CONTRACTORS AND SUBCONTRACTORS ON PUBLIC BUILDING OR PUBLIC WORK FINANCED IN WHOLE OR IN PART BY LOANS OR GRANTS FROM THE UNITED STATES

Contents

§3.1 Purpose and scope.
§3.2 Definitions.
§3.3 Weekly statement with respect to payment of wages.
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§3.6 Payroll deductions permissible with the approval of the Secretary of Labor.
§3.7 Applications for the approval of the Secretary of Labor.
§3.8 Action by the Secretary of Labor upon applications.
§3.9 Prohibited payroll deductions.
§3.10 Methods of payment of wages.
§3.11 Regulations part of contract.

AUTHORITY: R.S. 161, sec. 2, 48 Stat. 848; Reorg. Plan No. 14 of 1950, 64 Stat. 1267; 5 U.S.C. 301; 40 U.S.C. 3145; Secretary's Order 01-2008; and Employment Standards Order No. 2001-01.

SOURCE: 29 FR 97, Jan. 4, 1964, unless otherwise noted.

§3.1 Purpose and scope.

This part prescribes “anti-kickback” regulations under section 2 of the Act of June 13, 1934, as amended (40 U.S.C. 276c), popularly known as the Copeland Act. This part applies to any contract which is subject to Federal wage standards and which is for the construction, prosecution, completion, or repair of public buildings, public works or buildings or works financed in whole or in part by loans or grants from the United States. The part is intended to aid in the enforcement of the minimum wage provisions of the Davis-Bacon Act and the various statutes dealing with federally assisted construction that contain similar minimum wage provisions, including those provisions which are not subject to Reorganization Plan No. 14 (e.g., the College Housing Act of 1950, the Federal Water Pollution Control Act, and the Housing Act of 1959), and in the enforcement of the overtime provisions of the Contract Work Hours Standards Act whenever they are applicable to construction work. The part details the obligation of contractors and subcontractors relative to the weekly submission of statements regarding the wages paid on work covered thereby; sets forth the circumstances and procedures governing the making of payroll deductions from the wages of those employed on such work; and delineates the methods of payment permissible on such work.

§3.2 Definitions.

As used in the regulations in this part:

(a) The terms *building* or *work* generally include construction activity as distinguished from manufacturing, furnishing of materials, or servicing and maintenance work. The terms include, without limitation, buildings, structures, and improvements of all types, such as bridges, dams, plants, highways, parkways, streets, subways, tunnels, sewers, mains, powerlines, pumping stations, railways, airports, terminals, docks, piers, wharves, ways, lighthouses, buoys, jetties, breakwaters, levees, and canals; dredging, shoring, scaffolding, drilling, blasting, excavating, clearing, and landscaping. Unless conducted in connection with and at the site of such a building or work as is described in the foregoing sentence, the manufacture or furnishing of materials, articles, supplies, or equipment (whether or not a Federal or State agency acquires title to such materials, articles, supplies, or equipment during the course of the

manufacture or furnishing, or owns the materials from which they are manufactured or furnished) is not a *building* or *work* within the meaning of the regulations in this part.

(b) The terms *construction, prosecution, completion,* or *repair* mean all types of work done on a particular building or work at the site thereof, including, without limitation, altering, remodeling, painting and decorating, the transporting of materials and supplies to or from the building or work by the employees of the construction contractor or construction subcontractor, and the manufacturing or furnishing of materials, articles, supplies, or equipment on the site of the building or work, by persons employed at the site by the contractor or subcontractor.

(c) The terms *public building* or *public work* include building or work for whose construction, prosecution, completion, or repair, as defined above, a Federal agency is a contracting party, regardless of whether title thereof is in a Federal agency.

(d) The term *building or work financed in whole or in part by loans or grants from the United States* includes building or work for whose construction, prosecution, completion, or repair, as defined above, payment or part payment is made directly or indirectly from funds provided by loans or grants by a Federal agency. The term includes building or work for which the Federal assistance granted is in the form of loan guarantees or insurance.

(e) Every person paid by a contractor or subcontractor in any manner for his labor in the construction, prosecution, completion, or repair of a public building or public work or building or work financed in whole or in part by loans or grants from the United States is *employed* and receiving *wages,* regardless of any contractual relationship alleged to exist between him and the real employer.

(f) The term *any affiliated person* includes a spouse, child, parent, or other close relative of the contractor or subcontractor; a partner or officer of the contractor or subcontractor; a corporation closely connected with the contractor or subcontractor as parent, subsidiary, or otherwise, and an officer or agent of such corporation.

(g) The term *Federal agency* means the United States, the District of Columbia, and all executive departments, independent establishments, administrative agencies, and instrumentalities of the United States and of the District of Columbia, including corporations, all or substantially all of the stock of which is beneficially owned by the United States, by the District of Columbia, or any of the foregoing departments, establishments, agencies, and instrumentalities.

[29 FR 97, Jan. 4, 1964, as amended at 38 FR 32575, Nov. 27, 1973]

§3.3 Weekly statement with respect to payment of wages.

(a) As used in this section, the term *employee* shall not apply to persons in classifications higher than that of laborer or mechanic and those who are the immediate supervisors of such employees.

(b) Each contractor or subcontractor engaged in the construction, prosecution, completion, or repair of any public building or public work, or building or work financed in whole or in part by loans or grants from the United States, shall furnish each week a statement with respect to the wages paid each of its employees engaged on work covered by this part 3 and part 5 of this title during the preceding weekly payroll period. This statement shall be executed by the contractor or subcontractor or by an authorized officer or employee of the contractor or subcontractor who supervises the payment of wages, and shall be on the back of Form WH 347, “Payroll (For Contractors Optional Use)” or on any form with identical wording. Copies of Form WH 347 may be obtained from the Government contracting or sponsoring agency or from the Wage and Hour Division Web site at *http://www.dol.gov/esa/whd/forms/wh347instr.htm* or its successor site.

(c) The requirements of this section shall not apply to any contract of $2,000 or less.

(d) Upon a written finding by the head of a Federal agency, the Secretary of Labor may provide reasonable limitations, variations, tolerances, and exemptions from the requirements of this section subject to such conditions as the Secretary of Labor may specify.

[29 FR 97, Jan. 4, 1964, as amended at 33 FR 10186, July 17, 1968; 47 FR 23679, May 28, 1982; 73 FR 77511, Dec. 19, 2008]

§3.4 Submission of weekly statements and the preservation and inspection of weekly payroll records.

(a) Each weekly statement required under §3.3 shall be delivered by the contractor or subcontractor, within seven days after the regular payment date of the payroll period, to a representative of a Federal or State agency in charge at the site of the building or work, or, if there is no representative of a Federal or State agency at the site of the building or work, the statement shall be mailed by the contractor or subcontractor, within such time, to a Federal or State agency contracting for or financing the building or work. After such examination and check as may be made, such statement, or a copy thereof, shall be kept available, or shall be transmitted together with a report of any violation, in accordance with applicable procedures prescribed by the United States Department of Labor.

(b) Each contractor or subcontractor shall preserve his weekly payroll records for a period of three years from date of completion of the contract. The payroll records shall set out accurately and completely the name and address of each laborer and mechanic, his correct classification, rate of pay, daily and weekly number of hours worked, deductions made, and actual wages paid. Such payroll records shall be made available at all times for inspection by the contracting officer or his authorized representative, and by authorized representatives of the Department of Labor.

(Reporting and recordkeeping requirements in paragraph (b) have been approved by the Office of Management and Budget under control number 1215-0017)

[29 FR 97, Jan. 4, 1964, as amended at 47 FR 145, Jan. 5, 1982]

§3.5 Payroll deductions permissible without application to or approval of the Secretary of Labor.

Deductions made under the circumstances or in the situations described in the paragraphs of this section may be made without application to and approval of the Secretary of Labor:

(a) Any deduction made in compliance with the requirements of Federal, State, or local law, such as Federal or State withholding income taxes and Federal social security taxes.

(b) Any deduction of sums previously paid to the employee as a bona fide prepayment of wages when such prepayment is made without discount or interest. A *bona fide prepayment of wages* is considered to have been made only when cash or its equivalent has been advanced to the person employed in such manner as to give him complete freedom of disposition of the advanced funds.

(c) Any deduction of amounts required by court process to be paid to another, unless the deduction is in favor of the contractor, subcontractor, or any affiliated person, or when collusion or collaboration exists.

(d) Any deduction constituting a contribution on behalf of the person employed to funds established by the employer or representatives of employees, or both, for the purpose of providing either from principal or income, or both, medical or hospital care, pensions or annuities on retirement, death benefits, compensation for injuries, illness, accidents, sickness, or disability, or for insurance to provide any of the foregoing, or unemployment benefits, vacation pay, savings accounts, or similar payments for the benefit of employees, their families and dependents: *Provided, however,* That the following standards are met:

(1) The deduction is not otherwise prohibited by law;

(2) It is either:

(i) Voluntarily consented to by the employee in writing and in advance of the period in which the work is to be done and such consent is not a condition either for the obtaining of or for the continuation of employment, or

(ii) provided for in a bona fide collective bargaining agreement between the contractor or subcontractor and representatives of its employees;

(3) No profit or other benefit is otherwise obtained, directly or indirectly, by the contractor or subcontractor or any affiliated person in the form of commission, dividend, or otherwise; and

(4) The deductions shall serve the convenience and interest of the employee.

(e) Any deduction contributing toward the purchase of United States Defense Stamps and Bonds when voluntarily authorized by the employee.

(f) Any deduction requested by the employee to enable him to repay loans to or to purchase shares in credit unions organized and operated in accordance with Federal and State credit union statutes.

(g) Any deduction voluntarily authorized by the employee for the making of contributions to governmental or quasi-governmental agencies, such as the American Red Cross.

(h) Any deduction voluntarily authorized by the employee for the making of contributions to Community Chests, United Givers Funds, and similar charitable organizations.

(i) Any deductions to pay regular union initiation fees and membership dues, not including fines or special assessments: *Provided, however,* that a collective bargaining agreement between the contractor or subcontractor and representatives of its employees provides for such deductions and the deductions are not otherwise prohibited by law.

(j) Any deduction not more than for the “reasonable cost” of board, lodging, or other facilities meeting the requirements of section 3(m) of the Fair Labor Standards Act of 1938, as amended, and part 531 of this title. When such a deduction is made the additional records required under §516.25(a) of this title shall be kept.

(k) Any deduction for the cost of safety equipment of nominal value purchased by the employee as his own property for his personal protection in his work, such as safety shoes, safety glasses, safety gloves, and hard hats, if such equipment is not required by law to be furnished by the employer, if such deduction is not violative of the Fair Labor Standards Act or prohibited by other law, if the cost on which the deduction is based does not exceed the actual cost to the employer where the equipment is purchased from him and does not include any direct or indirect monetary return to the employer where the equipment is purchased from a third person, and if the deduction is either

(1) Voluntarily consented to by the employee in writing and in advance of the period in which the work is to be done and such consent is not a condition either for the obtaining of employment or its continuance; or

(2) Provided for in a bona fide collective bargaining agreement between the contractor or subcontractor and representatives of its employees.

[29 FR 97, Jan. 4, 1964, as amended at 36 FR 9770, May 28, 1971]

§3.6 Payroll deductions permissible with the approval of the Secretary of Labor.

Any contractor or subcontractor may apply to the Secretary of Labor for permission to make any deduction not permitted under §3.5. The Secretary may grant permission whenever he finds that:

(a) The contractor, subcontractor, or any affiliated person does not make a profit or benefit directly or indirectly from the deduction either in the form of a commission, dividend, or otherwise;

(b) The deduction is not otherwise prohibited by law;

(c) The deduction is either (1) voluntarily consented to by the employee in writing and in advance of the period in which the work is to be done and such consent is not a condition either for the obtaining of employment or its continuance, or (2) provided for in a bona fide collective bargaining agreement between the contractor or subcontractor and representatives of its employees; and

(d) The deduction serves the convenience and interest of the employee.

§3.7 Applications for the approval of the Secretary of Labor.

Any application for the making of payroll deductions under §3.6 shall comply with the requirements prescribed in the following paragraphs of this section:

(a) The application shall be in writing and shall be addressed to the Secretary of Labor.

(b) The application need not identify the contract or contracts under which the work in question is to be performed. Permission will be given for deductions on all current and future contracts of the applicant for a period of 1 year. A renewal of permission to make such payroll deduction will be granted upon the submission of an application which makes reference to the original application, recites the date of the Secretary of Labor's approval of such deductions, states affirmatively that there is continued compliance with the standards set forth in the provisions of §3.6, and specifies any conditions which have changed in regard to the payroll deductions.

(c) The application shall state affirmatively that there is compliance with the standards set forth in the provisions of §3.6. The affirmation shall be accompanied by a full statement of the facts indicating such compliance.

(d) The application shall include a description of the proposed deduction, the purpose to be served thereby, and the classes of laborers or mechanics from whose wages the proposed deduction would be made.

(e) The application shall state the name and business of any third person to whom any funds obtained from the proposed deductions are to be transmitted and the affiliation of such person, if any, with the applicant.

[29 FR 97, Jan. 4, 1964, as amended at 36 FR 9771, May 28, 1971]

§3.8 Action by the Secretary of Labor upon applications.

The Secretary of Labor shall decide whether or not the requested deduction is permissible under provisions of §3.6; and shall notify the applicant in writing of his decision.

§3.9 Prohibited payroll deductions.

Deductions not elsewhere provided for by this part and which are not found to be permissible under §3.6 are prohibited.

§3.10 Methods of payment of wages.

The payment of wages shall be by cash, negotiable instruments payable on demand, or the additional forms of compensation for which deductions are permissible under this part. No other methods of payment shall be recognized on work subject to the Copeland Act.

§3.11 Regulations part of contract.

All contracts made with respect to the construction, prosecution, completion, or repair of any public building or public work or building or work financed in whole or in part by loans or grants from the United States covered by the regulations in this part shall expressly bind the contractor or subcontractor to comply with such of the regulations in this part as may be applicable. In this regard, see §5.5(a) of this subtitle.

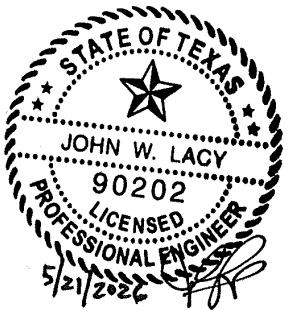
CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS
FOR THE CONSTRUCTION OF

WATER PLANT NO. 2 CDBG IMPROVEMENTS

LOCATED IN
WALLER COUNTY, TEXAS

PD JOB NO. 42241-01

Seals & Certifications



Pape-Dawson
Texas P.E. Board Firm Registration No. 470
John Lacy, P.E.
May 2026

The Professional Engineer whose signed and dated seal appears above was in responsible charge of preparing the following sections of the Contract Documents, which are fully identified by Section Number, Title and Number of Pages in the TABLE OF CONTENTS:

List of Specifications by section numbers.

01045, 01330, 01340, 01350,01410, 01415, 01710, 01780, 01782, 01810, 02100, 02140, 02215, 02140, 02260, 02316, 02320

TECHNICAL SPECIFICATIONS
FOR

CITY OF PRAIRIE VIEW
WATER PLANT NO. 2 CDBG IMPROVEMENTS

Prepared for:

Pape-Dawson
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Houston, Texas 77042

PREPARED BY

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118 Vintage Park Blvd. Suite W310
Houston, Texas 77070

TBPE FIRM NO. F-26942



April 13, 2026

G.E.# 131-2601

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-END OF SECTION –

SECTION 01045

COORDINATION WITH OWNER'S OPERATIONS

PART 1 GENERAL

1.01 SCOPE

This Section governs the requirements placed on the CONTRACTOR during the construction of the Work on an existing site where the OWNER's facilities are currently in operation. These requirements emphasize the necessity to coordinate with the OWNER or OPERATOR to keep the facility running and reduce any downtime necessary to make connections.

1.02 SUBMITTALS

A. Submit detailed schedule of proposed connections, including shutdowns and tie-ins.

B. Submittals shall include the anticipated time and date as well as the anticipated duration.

C. Submit the detailed connection schedule with the construction schedule. Submit specific time and date information to ENGINEER forty-eight (48) hours in advance of proposed work for OPERATOR's coordination.

1.03 OWNER
Name
Company
Address
City, State Zip
Phone Number

1.02 OPERATOR
Name
Company
Address
City, State Zip
Phone Number

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 INSTRUCTIONS

A. In general, CONTRACTOR's Work shall not hinder the continuous operation of the existing facilities during the construction period.

B. OPERATOR shall have full and safe access to all areas of the facility to perform their responsibilities in operating and maintaining the facility. Full access extends to personnel, equipment, and vehicles.

C. CONTRACTOR shall also avoid interference with private and public access as much as possible.

D. In the event of an emergency in order to protect public health, CONTRACTOR shall cease construction operations.

E. CONTRACTOR shall carefully coordinate all work and schedules and shall provide OWNER written notice at least forty-eight (48) hours before shutdowns or by-passes are required.

F. CONTRACTOR shall not operate any valve, gate, or other item of equipment without the OWNER's or OPERATOR's prior knowledge.

3.02 EXISTING FACILITIES

A. Maintain full access for OPERATOR.

B. Keep area clean and control dust and mud.

C. Keep all heavy equipment and truck traffic in area to a minimum.

3.03 NEW FACILITIES

A. Provide full access for personnel.

B. Install temporary walks and roadways to facilities if permanent access is not completed.

3.04 ELECTRICAL

Coordinate with OWNER and Power Company to maintain continuity of operation.

3.05 INSTRUMENTATION AND CONTROL WORK

Coordinate with OWNER to maintain continuity and transition of the plant operation from existing facilities to the new facilities.

- END OF SECTION -

SECTION 01330

SUBMITTALS

PART 1 GENERAL

1.01 SCOPE

This Section governs the administrative and procedural requirements for submittals required for performance of the Work. General submittals which may be required by Owner or Engineer include, but are not limited to:

A. Contractor's Construction/Progress Schedule
B. Submittal Schedule
C. Weekly Construction Reports
D. Quality Assurance Submittals
E. List of Subcontractors
F. Permits
G. Bonds and Insurance Certificates

1.02 RELATED SECTIONS

SECTION 00700 – General Conditions
SECTION 01005 – Summary of Work
SECTION 01292 – Schedule of Values
SECTION 01340 – Shop Drawings, Product Data and Samples
SECTION 01710 – Project Record Documents
SECTION 01782 – Operations & Maintenance Data
SECTION 02140 – Control of Groundwater and Surface Water

1.03 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
3. The Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.

B. Processing: To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for submittal review, including time for re-submittals.

1. Allow 2 weeks for initial review. Allow additional time if the Engineer must delay processing to permit coordination with subsequent submittals.
2. If an intermediate submittal is necessary, process the same as the initial submittal.
3. Allow 2 weeks for reprocessing each submittal.
4. No extension of Contract Time will be authorized because of failure to transmit submittals to the Engineer sufficiently in advance of the work to permit processing.

C. Submittal Preparation:

1. Contractor shall affix to each submittal a Contractor's signature block certifying that the items have been reviewed in detail and arc correct and in accordance with Contract Documents, except as noted by any requested variance on the Contractor's Transmittal Form.
2. Place a permanent label on each submittal for identification which includes the following information:

    a. Project name.
    b. Date.
    c. Name and address of the Engineer.
    d. Submittal number. (Sequentially number each submittal beginning with the number "1". Re-submittals shall use the original number with an alphabetic suffix (i.e., 2A for first resubmittal of Submittal 2 or 15C for third resubmittal of Submittal 15).
    e. Name and address of the Contractor.
    f. Name and address of the Subcontractors.
    g. Name and address of the supplier.
    h. Name of the manufacturer.
    i. Number and title of the appropriate specification Section.
    j. Drawing number and detail references, as appropriate.

D. Submittal Transmittal:

1. Package each submittal appropriately for transmittal and handling. Each submittal shall only contain one type of work, material or equipment. Mixed submittals will not be accepted.
2. Include with each submittal a Transmittal Form. A sample copy of an acceptable form is attached hereto. Contractor's standard submittal form may be used provided it contains essentially the same information as the sample.
3. The Engineer will not accept submittals received from sources other than the Contractor.

1.04 CONTRACTOR'S CONSTRUCTION/PROGRESS SCHEDULE

A. Bar-Chart Schedule: Prepare a fully developed, horizontal bar-chart-type, contractor's construction schedule. Submit within 14 days after execution of Contract. Provide a separate time bar for each significant construction activity.

1. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the Schedule of Values.
2. Within each time bar, indicate estimated completion percentage in 20% increments. As work progresses, place a contrasting mark in each bar to indicate "Actual Completion."
3. Prepare the schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.
4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence; indicate graphically the sequences necessary for completion of related portions of the Work.
5. Coordinate the Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittal Schedule, progress reports, payment requests, and other schedules.
6. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Engineer's procedures necessary for certification of Substantial Completion.

B. Phasing: On the schedule, show how requirements for phased completion to permit work by separate Contractors and partial occupancy by the Owner affect the sequence of work.

C. Work Stages: Indicate important stages of construction for each major portion of the Work, including submittal review, testing, and installation.

D. Cost Correlation: At the head of the schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of work performed as of the dates used for preparation of payment requests.

E. Distribution: Following response to the initial submittal, print and distribute copies to the Engineer, subcontractors, and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office, if applicable. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

F. Schedule Updating: Revise the schedule after each meeting, event, or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

1.05 SUBMITTAL SCHEDULE

A. After development and acceptance of the Contractor's Construction Schedule, prepare a complete schedule of submittals. Submit the schedule within 10 days after the preconstruction conference.

1. Coordinate Submittal Schedule with the list of subcontractors, Schedule of Values, and the list of products as well as the Contractor's Construction Schedule.
2. Provide the following information:

a. Scheduled date of submittal.
b. Related section number.
c. Submittal category (Shop Drawings, Schedules, etc.).
d. Name of the Subcontractors.
e. Description of the part of the work covered.
f. Scheduled date of resubmitted, if required.
g. Scheduled date for the Engineer's final release or approval.

B. Distribution: Following response to the initial submittal, print and distribute copies to the Engineer, Subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office, if applicable. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

C. Schedule Updating: Revise the schedule after each meeting or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

1.06 SCHEDULE OF VALUES

A. If the unit price Contract contains major lump sum items, a Schedule of Values (itemized list that establishes the value of each part of the Work) may be required according to the General Conditions. A major lump sum item is a lump sum item having a value greater than 4% of the Contract Price or one hundred thousand dollars ($100,000), whichever is less.

B. For lump sum equipment items where submittal of operation/maintenance data and testing are required, include a separate item for equipment operation and maintenance data submittal valued at 5% of the lump sum amount for each equipment item and a separate

item for testing and adjusting valued at 5% of the lump sum amount for each equipment item.

C. Round off figures for each listed item to the nearest one hundred dollars ($100.00), except for the value of one item, if necessary, to make the total of all items in the Schedule of Values equal the Contract Price.

D. Revise the Schedule of Values and resubmit for items affected by Contract modifications, Change Orders, and Work Change Directives.

1.07 WEEKLY CONSTRUCTION REPORTS

A. Prepare a weekly construction report recording the following information concerning events at the site and submit duplicate copies to the Engineer at weekly intervals.

1. List of Subcontractors at the site.
2. General weather conditions.
3. Accidents and unusual events.
4. Meetings and significant decisions.
5. Stoppages, delays, shortages, and losses.
6. Orders and requests of governing authorities.
7. Change Orders received, implemented.
8. Services connected, disconnected.
9. Equipment or system tests and start-ups.
10. Partial completions, occupancies.
11. Substantial completions authorized.
12. Submittals submitted to the Engineer.
13. Submittals approved or rejected by the Engineer.

1.08 SHOP DRAWINGS AND PRODUCT DATA

A. Shop Drawings: Submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Construction Plans.

1. Do not reproduce Construction Plans or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.
2. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:

a. Field and erection dimensions clearly identified as such.
b. Arrangement and section views.

c. Relation to adjacent materials or structures, including complete information for making connections between work under this Contract and work under other contracts.
d. Kinds of materials and finishes.
e. Parts list and descriptions.
f. Assembly drawings of equipment components and accessories showing their respective positions and relationships to the complete equipment package.
g. Identification of products and materials included by sheet and detail number.
h. Compliance with specified standards.
i. Notation of coordination requirements.
j. Notation of dimensions established by field measurement.

3. Make Shop Drawings to scale providing a true representation of the specific equipment or item to be furnished.

4. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 11 inches by 17 inches but no larger than 24 inches by 36 inches, unless otherwise pre-approved by the Engineer prior to submittal.

B. Product Data: Collect product data into a single submittal for each element of construction or system. Product data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves.

1. Mark each copy to show applicable choices and options. Where printed product data includes information on several products that are not required, mark copies to indicate the applicable information. Include the following information:

a. Manufacturer's printed recommendations.
b. Compliance with trade association standards.
c. Compliance with recognized testing agency standards.
d. Application of testing agency labels and seals.
e. Notation of dimensions verified by field measurement.
f. Notation of coordination requirements.

C. Submittals: Do begin making submittals until compliance with requirements of the Contract Documents has been confirmed and a Submittal Schedule prepared.

1. Submit at least 6 copies for the Engineer's review. The Engineer will return all but 2 copies or prints marked with actions taken and corrections or modifications required.
2. One of the copies returned shall be marked up and maintained as a "Record Document."

D. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.

1. Do not proceed with installation/construction until copies of all Shop Drawing and product data submittals have been received by the appropriate parties.
2. Do not permit use of unmarked copies of Shop Drawings and product data in connection with installation/construction.

1.09 SAMPLES

A. When required by the Technical Specifications, Submit Samples that include partial sections of manufactured or fabricated components, cuts, or containers of materials, color range sets, and swatches showing color, texture, and pattern. Include the following:

1. Specification Section number and reference.
2. Sample source.
3. Product name or name of the manufacturer.
4. Availability and delivery time.

B. Submit Samples for review of size, kind, color, pattern, and texture. Submit units for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

1. Where variation in color, pattern, texture, or other characteristics is inherent in the material or product represented, submit at least 3 multiple units that show approximate limits of the variations.
2. Samples to be returned to the Contractor for incorporation in the Work must be undamaged at time of use.
3. Samples not incorporated into the Work, or otherwise designated as the Owner's property, are the property of the Contractor and shall be removed from the site prior to Substantial Completion.

1.10 QUALITY ASSURANCE SUBMITTALS

A. Submit Quality Control Submittals, including design data, certificates, manufacturer's instructions, manufacturer's field reports, warranties, and other quality-control submittals as required in the Technical Specifications.

B. Certifications: Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit a notarized certification from the manufacturer certifying compliance with specified requirements. Certification shall be signed by an officer of the manufacturer or other individual authorized to sign documents on behalf of the company.

C. Inspection and Test Reports: Requirements for submittal of inspection and test reports from independent testing agencies are specified in the Section titled "Testing Laboratory Services."

1.11 GROUNDWATER AND SURFACE WATER CONTROL PLAN

Prepare and submit, at Owner's request, a Groundwater and Surface Water Control Plan in accordance with this Section and the Section titled "Control of Groundwater and Surface Water."

1.12 RECORD DOCUMENTS

If directed by the Engineer, prepare and submit record documents in accordance with this Section and the Section titled "Project Record Documents."

1.13 OPERATIONS AND MAINTENANCE DATA

If required, prepare and submit operations and maintenance data in accordance with this Section and the Section titled "Operations and Maintenance Data."

1.14 ENGINEER'S ACTION

A. Except for submittals for record or information, where action and return is required, the Engineer will review each submittal, mark to indicate action taken, and return promptly. Compliance with specified characteristics is the Contractor's responsibility.

B. Action Stamp: The Engineer will stamp each submittal with a uniform, action stamp. The Engineer will mark the stamp appropriately to indicate the action taken, as follows:

1. Final Unrestricted Release: When the Engineer marks a submittal "Approved," the work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
2. Final-But-Restricted Release: When the Engineer marks a submittal "Approved as Noted," the work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
3. Returned for Resubmittal: When the Engineer marks a submittal "Revise and Resubmit," do not proceed with work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark. Do not use, or allow others to use, submittals marked "Revise and Resubmit" at the Project Site or elsewhere where work is in progress.
4. Other Action: Where a submittal is for information or record purposes or special processing or other activity, the Engineer will return the submittal marked "Not Approved."

5. Engineer's review and approval of each submittal are expressly limited as provided in the Contract Documents and are only to determine compliance with information given in Contract Documents and conformance with design concept of the completed Project as a functioning whole. Contractor is, and Engineer is not, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, and construction for all safety aspects of performing and coordinating the Work.

1.15 UNSOLICITED SUBMITTALS

The Engineer will return unsolicited submittals to the sender without action.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 SUPPLEMENTS

A. The Submittal Transmittal Form, immediately following this paragraph, is part of this Section.

- END OF SECTION -

SUBMITTAL TRANSMITTAL FORM

PROJECT NAME: _____

OWNER: _____

SUBMITTAL NUMBER: _____ RESUBMITTAL: YES_____NO_____

DATE: _____ NUMBER OF COPIES SUBMITTED: _____

SUBMITTAL DESCRIPTION: _____

_____

_____

ASSOCIATED SPECIFICATION SECTION NO: _____

REFERENCED DRAWING SHEET NO: _____

SUBCONTRACTOR/SUPPLIER/MANUFACTURER PROVIDING SUBMITTAL DATA:

Name: _____

Address: _____

Telephone Number: _____

CONTRACTOR:

Name: _____

Address: _____

Telephone Number: _____

CONTRACTOR'S CERTIFICATION:

The undersigned, as representative of Contractor for the above Project, submits the following and certifies that:

1. Submittal has been reviewed and it is complete and conforms to requirements of Contract Documents except as noted.
2. Required dimensions have been field verified and are acceptable for installation of proposed products and construction of proposed work.
3. Required quantities for products and materials covered by this submittal have been verified as correct.
4. Fabrication processes and construction methods proposed in this submittal are acceptable for this Project and will result in a complete, functional installation.
5. Submittal has been coordinated with other submittals and work and proposed products and construction will properly interface with other construction.

NAME OF CONTRACTOR REVIEWER: _____

SIGNATURE OF CONTRACTOR REVIEWER: _____

DATE: _____

Section 01340

SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 GENERAL

1.01 SCOPE

This Section governs the methods, schedule, and process followed for shop drawings, product data, and sample submittals.

1.02 RELATED SECTIONS

SECTION 00700 – General Conditions
SECTION 00800 – Special Conditions
SECTION 00810 – Additional Conditions
SECTION 01330 – Submittals

1.03 REQUIREMENT

A. Submit electronic shop drawings, product data and samples as required by General Conditions and as designated in Specifications using procedures specified in Section 01330 - Submittals and requirements of this Section.

B. Shop drawings, product data, and samples are not considered Contract Documents.

C. Registered Professional Engineer licensed by State of Texas must sign and seal design deviations from contract documents.

1.04 SHOP DRAWING/SUBMITTAL SCHEDULE

Submit separate Shop Drawing/Submittal schedule at same time Construction Schedule is submitted. List products, materials, and equipment for which Shop Drawings and other submittals are required in the order in which they appear in Specifications. Include product data and sample submittals in schedule. Application for payment will not be processed until schedule of shop drawing submittals is approved by Project Manager.

1.05 SHOP DRAWINGS

A. Submit electronic copy of Shop Drawings and product date in *.PDF format. Review and sign Shop Drawings indicating compliance with Contract.

B. Place Contractor's Stamp on each drawing as described in Section 01330 - Submittals.

C. Show the following accurately and distinctly:

1. Field and erection dimensions
2. Arrangement and section views
3. Relation to adjacent materials or structure, including complete information for making connections between work under this Contract and work under other contracts
4. Types of materials and finishes
5. Parts list and descriptions
6. Assembly drawings of equipment components and accessories showing respective positions and relationships to complete equipment package
7. Identify details by reference to drawing sheet and detail numbers, schedule or room numbers as shown on Contract Drawings where necessary for clarity.

D. Scale drawings to provide true representation of specific equipment or item furnished.

E. Coordinate and submit components, necessary for Engineer to adequately review submittal, as complete package. Reproduction of design drawings for use of shop drawings is not allowed.

F. For major changes to original documents, submit CAD drawings in original CAD format.

1.06 PRODUCT DATA

A. Submit product data for review as required in Specification sections.

B. Place Contractor's Stamp, on each data item submitted, as described in Section 01330 - Submittal Procedures.

C. Mark each copy to identify applicable products, models, and options to be used in this Project. Supplement manufacturers' standard data to provide information unique to this Project, where required by Specifications.

D. Give manufacturers' trade name, model, or catalog designation and applicable reference standard for products specified only by reference standard.

E. Submit revised data and samples for resubmittal in manner required for initial submission.

1.07 SAMPLES

A. Submit samples for review as required by Specifications. Have samples reviewed and signed by Registered Professional.

B. Place Contractor's Stamp on each sample or firmly attached sheet of paper, as described in Section 01330 - Submittals.

C. Submit number of samples specified in Specifications; one will be retained by Project Manager.

D. Reviewed samples that may be used in Work are identified in Specifications.

E. Provide mark up as identified in Specifications.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

- END OF SECTION –

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SECTION 01350

CONSTRUCTION SCHEDULE

PART 1 GENERAL

1.01 SCOPE

This section governs the responsibility of the CONTRACTOR to furnish a construction schedule as required by the Contract Documents.

1.02 RELATED SECTIONS ****** Modify sections per project/contract documents used***

SECTION 01330 – Submittals
SECTION 01340 – Shop Drawings, Product Data and Samples
SECTION 00700 – General Conditions***
SECTION 00800 – Special Conditions***
SECTION 01005 – Summary of Work

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 RESPONSIBILITY OF THE CONTRACTOR

A. In accordance with SECTION 00700 – General Conditions of the Agreement and SECTION 00800 – Special Conditions, the CONTRACTOR shall submit a construction schedule to the ENGINEER for approval within 5 days of issuance of the Notice to Proceed. Pay estimates will not be processed until the construction schedule is received and approved.

B. The construction schedule shall be reviewed periodically by the CONTRACTOR and revised to reflect actual work performance. The schedule will be of the bar graph (Gantt Chart) type detailing major items of work to be performed.

- END OF SECTION -

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SECTION 01410

TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 SCOPE

This Section governs the inspections and testing required by laws, ordinances, rules and regulations, or orders of public authorities and are the responsibility of the CONTRACTOR. Contained in the various specification sections are the requirements for certification of products, testing, adjusting and balancing of equipment, and other tests and standards.

1.02 CONDITIONS

A. Testing observation and control of materials required by the Technical Specifications, unless otherwise specified, approved, or directed by OWNER or ENGINEER, shall be performed by a commercial testing laboratory meeting specified requirements.

B. OWNER will pay for services for commercial testing laboratory for field control of the Work as specified in respective Technical Specification sections.

C. CONTRACTOR shall pay for testing in specified manner, by same testing laboratory selected by OWNER, or shall pay for or perform testing in specified manner when approved by OWNER or ENGINEER:

1. Tests to design or re-design and establish quality of materials proposed for use:

    a. Mix design: Portland cement concrete.
    b. Aggregate gradations.
    c. Fixing fine and coarse aggregate gradations.
    d. Preparation of mix design specimens and testing of mix design specimens for strength and quality.

2. Re-testing when initial tests indicate work does not comply with specified requirements.

3. Testing and observation performed for CONTRACTOR's convenience.

D. Specified testing frequencies are recommended standards and may be increased or decreased by the OWNER or ENGINEER as deemed necessary for quality control of materials and the Work.

E. Reports and commentaries by testing laboratory shall in no way relieve CONTRACTOR of his obligation to perform work in full compliance with standards and provisions of the specified requirements.

F. OWNER reserves the right to take samples and specimens and conduct tests on material and work provided by CONTRACTOR to assure quality control.

1.03 RELATED WORK

A. General Conditions: Observation and testing required by laws, ordinances, rules and regulations, or orders of public authorities are the responsibility of the CONTRACTOR.

B. Technical Specifications: Contained in the Technical Specifications are requirements for certification of products, testing, adjusting and balancing of equipment, and other tests and standards.

1.04 WORK INCLUDED

Testing is required for, but not limited to, the following items of work:

A. Compaction of fill or backfill.
B. Subgrade stabilization.
C. Cast-in-place concrete.

1.05 TESTING LABORATORY

A. Duties:

1. Cooperation: Cooperate with the ENGINEER and CONTRACTOR; provide qualified personnel promptly on notice.

2. Performance: Perform specified observations, sampling and testing of materials and methods of construction:

a. Comply with specified standards; ASTM, other recognized authorities, and as specified.

b. Note whether observations, sampling, and testing complies with the specified requirements.

3. Notification: If any test fails or if observation indicates that the Work is not satisfactory, contact Costello, Inc. at 713-783-7788 (FAX 713-783-3580), email: **<<Engineer's email address>>** immediately.

4. Reports: Prepare daily field activity logs documenting observations and tests performed.

a. Include the following information for each test as well as additional data specified:

i. Date of test.
ii. Location of test.
iii. Specified requirements.

iv. Test results.
v. Remarks.

b. The Laboratory will distribute electronic copies of the reports to the OWNER, ENGINEER, CONTRACTOR, and the applicable governmental agencies.

B. Limits of Authority: The Laboratory is not authorized to:

1. release, revoke, alter, or enlarge on the specified requirements,
2. approve or accept any portion of the Work, or
3. perform any duties of the CONTRACTOR.

1.06 CONTRACTOR'S RESPONSIBILITIES

A. Obligations:

1. Employment of a testing laboratory by the OWNER in no way relieves the CONTRACTOR of his obligation to perform the Work according to the Contract Documents.

2. Cooperation: Cooperate with laboratory personnel; provide access to the Work or to manufacturer's operations.

3. Samples: Provide to Laboratory preliminary representative samples or access to obtain samples of materials to be tested, in required quantities.

4. Reports: Furnish copies of mill test reports.

5. Labor: Furnish labor and equipment to:

a. provide access to the Work to be tested,
b. obtain and handle samples at the site, if requested by the Laboratory, and
c. assist with observations and tests.

6. Notification: Notify the testing Laboratory at least 1 working day in advance of operations to allow for his assignment of personnel and test scheduling.

7. Arrangements: Arrange with the testing Laboratory and pay for additional samples and tests required for the CONTRACTOR's convenience.

8. Re-testing: If a test reveals noncompliance, re-tests will be charged to the CONTRACTOR. Additional tests may be ordered by the ENGINEER or OWNER to assure compliance with the specified requirements herein or to conform to any public agency's requirements. If these additional tests ordered reveal noncompliance, the tests will be charged to the CONTRACTOR, including any additional fee of the ENGINEER. However, if additional tests verify compliance, the OWNER will bear the cost.

9. Convenience Testing: Testing or observation performed exclusively for the CONTRACTOR's convenience is the responsibility of the CONTRACTOR.

10. Payment to Testing Lab: The CONTRACTOR shall, prior to receiving final payment, provide documentation from the testing Laboratory indicating complete payment of the services.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

- END OF SECTION -

SECTION 01415

OBSERVATION OF CONSTRUCTION

PART 1 GENERAL

1.01 SCOPE

This Section governs the duties, responsibilities, and limitations of authority of the project representative in connection with his observation of the work.

1.02 AUTHORITY BY ENGINEER

A. Provisions for the Engineer's project representation are set forth in the "GENERAL CONDITIONS." In particular, the definition of the Engineer's duties provides authority for observation of the work.

B. Special Testing

The project representative's authority to require special observation or testing in connection with rejected work is also provided in the "GENERAL CONDITIONS." Furthermore, the provision that, upon request by the Contractor, the project representative observe and accept or reject any material furnished, is also granted in the "GENERAL CONDITIONS."

C. Removing Work

The provision for removing work for observation by the project representative is granted in the "GENERAL CONDITIONS."

1.03 DEFINITIONS

A. Project Representative

A project representative of the Owner may be assigned authority to observe the work. If the individual so named is the Engineer, the Engineer's project representative will be assigned such authority.

B. Normal Working Days

Normal working days for project representatives are defined as Monday through Friday, exclusive of holidays. If the Contractor plans work on a Saturday, Sunday or legal holiday, work arrangements should be made for a project representative not later than 3 working days before the last normal working day before the Saturday, Sunday or legal holiday.

C. Uninspected Work

The Engineer may request that the Contractor to remove or replace any work completed that was not observed by the project representative. Removal or replacement will be completed at no additional cost to the Owner.

1.04 PROJECT REPRESENTATIVE

A. Translation

Assist the Contractor's superintendent in understanding the intent of the Technical Specifications and the Construction Plans.

B. Spot Checks

Conduct on-site observations and spot checks of the work in progress as a basis for determining conformance of work, materials and equipment with the Technical Specifications and the Construction Plans.

C. Consideration

Consider and evaluate suggestions or recommendations which may be submitted by the Contractor to the Engineer and report them with recommendations to the Engineer for final decision.

D. Scheduling

Be alert to the construction schedule and to conditions which may cause delay in completion and report same to Engineer.

E. Liaison

Maintain liaison with the Contractor and all subcontractors on the project only through the Contractor's superintendent.

F. Participation

Attend conferences held at the project site as directed by the Engineer. Report to the Engineer the results of such meetings.

G. Advising

Advise the Engineer in advance of the schedules of tests and observe that tests at the project site which are required by the Technical Specifications and Construction Plans are actually conducted. Observe, record, and report to the Engineer all details relative to the test procedures.

H. Accompanying Others

Accompany anyone representing local, state, or federal agencies having jurisdiction, on site visits of the project. Record and report to the Engineer the results of these site visits.

I. Receiving

Receive samples which are required to be furnished at the site; record date received and from whom and notify the Engineer of their readiness for examination; record Engineer's approval or rejection; and maintain custody of approved samples.

J. Reviewing

Review applications for payment submitted by the Contractor and forward them with recommendations regarding payment and progress to the Engineer.

K. Checking

After Substantial Completion, check each incomplete or defective item as it is corrected.

L. Reporting

If a situation arises during construction which requires that work be rejected, report such situation immediately to the Engineer.

M. Limitations

The project representative shall not:

1. authorize deviations from the Contract Documents,

2. personally conduct any test,

3. enter into the area of responsibility of the Contractor's superintendent,

4. expedite the work for the Contractor,

5. advise on, or issue directions relative to any aspect of construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the work,

6. authorize or suggest that the Owner occupy the project, in whole or in part, prior to Substantial Completion,

7. issue a recommendation for payment,

8. exceed limitations of Engineer's authority as set forth in the Contract Documents, or

9. accept Shop Drawings or Samples from anyone other than the Contractor.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

- END OF SECTION -

SECTION 01710

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 SCOPE

This Section governs the preparation and maintenance of "record documents" for the Project to accurately reflect the constructed "as-built" conditions. Documents must be submitted at work completion as a condition of final acceptance. Mark all changes with red ink or pencil.

1.02 MAINTENANCE OF RECORD DOCUMENTS

A. Maintain at the job site, 1 copy of:

1. the Contract Documents (including Construction Plans and all Technical Specifications, addenda, etc.),

2. "approved" Shop Drawings,

3. change orders, field orders, and other contract modifications, and

4. field test records.

B. Store record documents in an approved location apart from documents used for construction. Do not use record documents for construction purposes. Provide files and racks for orderly storage. Maintain documents in a clean, dry, legible condition. Make documents available at all times to the Engineer.

1.03 RECORDING

A. Keep record documents current. Do not permanently conceal any work until required information has been recorded.

B. Label each document "PROJECT RECORD" in 2-inch high printed letters. Legibly mark contract drawings to record actual construction:

1. Horizontal and vertical location of underground and under-slab utilities and appurtenances referenced to permanent surface improvements.

2. Location of internal utilities and appurtenances referenced to permanent surface improvements.

3. Field changes of dimension and detail.

4. Changes made by change order or field order.

5. Details not on original Construction Plans.

C. Legibly mark specifications and addenda 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, and

3. other matters not originally specified.

1.04 SUBMITTAL

A. At project completion, submit record documents to the Engineer. Place all letter-sized material in a three-ring binder, neatly indexed. Bind Construction Plans and Shop Drawings in rolls of convenient size for ease of handling.

B. Accompany the submittal with a transmittal letter in duplicate, containing:

1. the date,
2. the project title and number,
3. the Contractor's name and address,
4. title and number of each record document,
5. a certificate that each document as submitted is complete and accurate, and
6. the Contractor's signature.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

- END OF SECTION -

SECTION 01780

CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 SCOPE

This Section governs the requirements for closing the project including final tasks and documentation.

1.02 SUBMITTALS

Submit the following information submittals prior to application for final payment:

A. Record Documents: As required in General Conditions.
B. Special bonds, Special Guarantees, and Service Agreements.
C. Consent of Surety to Final Payment: As required in General Conditions.
D. Releases or Waivers of Liens and Claims: As required in General Conditions.
E. Final Application tor Payment: Submit in accordance with procedures and requirements stated in General Conditions.
F. Release from Agreements.
G. Spare Parts and Special Tools: As required by individual Specification sections.

1.03 RELEASES FROM AGREEMENTS

A. Furnish Owner written releases from property owners or public agencies where side agreements or special easements have been made, or where Contractor's operations have not been kept within the Owner's construction right-of-way,

B. In the event Contractor is unable to secure written releases:

1. Inform Owner of the reasons,

2. Owner or its representatives will examine the Site, and Owner will direct Contractor to complete the Work that may be necessary to satisfy terms of the side agreement or special easement.

3. Should Contractor refuse to perform this Work, Owner reserves right to have it done by separate contract and deduct cost of same from Contract Price, or require Contractor to furnish a satisfactory bond in a sum to cover legal Claims for damages,

4. When Owner is satisfied that the Work has been completed in agreement with Contract Documents and terms of side agreement or special easement, right is reserved to waive requirement for written release if:

a. Contractor's failure to obtain such statement is due to grantor's refusal to sign, and this refusal is not based upon any legitimate Claims that Contractor has failed to fulfill terms of side agreement or special easement, or

b. Contractor is unable to contact or has had undue hardship in contacting grantor.

1.04 SPARE PARTS AND SPECIAL TOOLS

A. The Contractor shall furnish spare parts data for each different item of equipment listed. The data shall include a complete list of parts and supplies, with current unit prices and source or sources of supply.

B. Contractor shall also furnish a list of parts and supplies that are either normally furnished at no extra cost with the purchase of the equipment or specified to be furnished as part of the Contract and a list of additional items recommended by the manufacturer to assure efficient operation for a period of one hundred twenty (120) days for the particular installation.

C. All parts shall be securely boxed and tagged and clearly marked on the box individually for identification as to the name of manufacturer or supplier, applicable equipment, part number, description and location in the equipment. All parts shall be protected and packaged for a shelf life of at least ten (10) years.

D. Contractor shall furnish at no additional cost to the Owner with each piece of equipment as a minimum, one (I) complete set, or the number of sets called for in the Technical Specifications, of suitably marked special tools and appliances which may be needed to adjust, operate, maintain, or repair the equipment. Such tools and appliances shall be furnished in approved painted steel cases properly labeled and equipped with good grade cylinder locks and duplicate keys.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 FINAL CLEANING

A. At completion of the Work or of a part thereof and immediately prior to Contractor’s request for certificate of Substantial Completion; or if no certificate is issued, immediately prior to Contractor's notice of completion, clean entire Site or parts thereof, as applicable:

1. Leave the Work and adjacent areas affected in a cleaned condition satisfactory to Owner and Engineer.

2. Remove grease, dirt, dust, paint or plaster splatter, stains, labels, fingerprints, and other foreign materials from exposed surfaces,

3. Repair, patch, and touch up marred surfaces to specified finish and match adjacent surfaces,

4. Clean all windows,

5. Clean and wax wood, vinyl, or painted floors.

6. Broom clean exterior paved driveways and parking areas.

7. Hose clean sidewalks, loading areas, and others contiguous with principal structures.

8. Rake clean all other surfaces.

9. Replace air-handling filters and clean ducts, blowers, and coils of ventilation units operated during construction.

10. Leave water courses, gutters, and ditches open and clean.

B. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.

- END OF SECTION –

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SECTION 01782

OPERATIONS AND MAINTENANCE DATA

PART 1 GENERAL

3.01 SCOPE

This Section governs the submittal requirements for equipment and facility operating and maintenance manuals. The CONTRACTOR shall be responsible for receipt of operation and maintenance data from manufacturers, suppliers, and subcontractors.

3.02 RELATED SECTIONS

SECTION 01330 – Submittals
SECTION 01340 – Shop Drawings, Product Data and Samples

3.03 SUBMITTALS

A. Along with the schedule for other submittals as required in Section 01330 Submittals submit a list of operation and maintenance manuals and parts manuals to be provided.

B. Submit documents, 8-½ inch by 11 inch text pages, bound in 3 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 the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

E. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified.

1. Part 1: Directory, listing names, addresses, and telephone numbers of Engineer, 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 the 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 the following:

a. Shop drawings and product data.
b. Air and water balance reports.
c. Certificates.
d. Photocopies of warranties.

F. Within one (1) month prior to placing the equipment or facility in service, submit two (2) copies of operation and maintenance manual and parts manual for *initial* review and comment.

G. Submit one (1) copy of completed volumes in final form, a minimum of ten (10) days prior to final inspection. This copy will be returned after final inspection, with Engineer's comments based on final inspection. Revise content of documents as required prior to final submittal.

H. Revise and resubmit two (2) copies of final version and a copy in digital format on a media drive within ten (10) days after receipt of comments associated with final inspection.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 EQUIPMENT OPERATION AND MAINTENANCE DATA

A. Furnish operation and maintenance manuals for all equipment. Operation and maintenance manual must contain all information required for Owner to operate, maintain, and repair equipment. The manual must be prepared by equipment manufacturer, furnished to the Engineer by Contractor, and, as a minimum, contain the following:

1. Name, address and telephone number of the nearest competent service representative who can furnish parts and technical service. If this is not the manufacturer’s own

service department, then furnish the letters confirming that the named organization has been factory authorized to represent the manufacturer of the equipment furnished.

2. Descriptive literature, including illustrations, covering the operation features of the equipment, specific for the particular installation, with all inapplicable information omitted or marked out.

3. Equipment functions, normal operating characteristics, and limiting conditions.

4. Assembly, installation, alignment, adjustment, and checking instructions.

5. Operating instructions for start-up, normal operation, regulation and control, normal shutdown, and emergency shutdown.

6. Lubrication and detailed maintenance instructions. The maintenance instructions are to include detailed drawings giving the location of each maintainable part and lubrication point and detailed instructions on disassembly and reassembly of the equipment.

7. Troubleshooting guide.

8. 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.

9. Outline, cross section, and assembly drawings; engineering data; wiring diagram.

10. Test data and performance curves.

B. Furnish parts manuals for all equipment. The manual must be prepared by equipment manufacturers, furnished to Engineer by Contractor, and, as a minimum, contain the following.

1. Detailed drawings giving the 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.

- END OF SECTION -

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SECTION 01810

EQUIPMENT TESTING AND FACILITY START-UP

PART 1 GENERAL

1.01 SCOPE

This Section governs the general procedures for the testing of equipment and initial start-up of the completed facility. The procedures include the planning of the process and sequencing of the units.

1.02 DEFINITIONS

A. Facility: Entire Project, or an agreed-upon portion, including its entire unit processes.

B. Functional Test: Test or tests in presence of Engineer and Owner to demonstrate that installed equipment meets manufacturer's installation, calibration, and adjustment requirements and other requirements as specified.

C. Performance Test: Test or tests performed after any required functional test in presence of Engineer and Owner to demonstrate and confirm individual equipment meets performance requirements specified in individual sections.

D. Unit Process: As used in this section, a unit process is a portion of the facility that performs a specific process function, such as aeration blower system, bio-filter irrigation system, and humidification system.

E. Facility Performance Demonstration:

1. A demonstration, conducted by Contractor, with assistance of Owner, to demonstrate and document the performance of the entire operating facility, both manually and automatically (if required), based on criteria developed in conjunction with Owner and as accepted by Engineer.
2. Such demonstration is for the purposes of:

    a. verifying to Owner entire facility performs as a whole, and

    b. Documenting performance characteristics of completed facility for Owner's records. Neither the demonstration nor the evaluation is intended in any way to make performance of a unit process or entire facility the responsibility of Contractor, unless such performance is otherwise specified.

1.03 SUBMITTALS

Informational Submittals:

A. Facility Start-up and Performance Demonstration Plan.
B. Functional and performance test results.
C. Completed Unit Process Start-up Form tor each unit process.
D. Completed Facility Performance Demonstration Certification Form.

1.04 FACILITY START-UP AND PERFORMANCE DEMONSTRATION PLAN

Develop a written plan, in conjunction with Engineer's and Owner's operations personnel defining the start-up sequence for unit processes and the complete facility.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 GENERAL

A. Facility Start-up Meetings: Schedule a meeting a minimum of 60 days prior to substantial completion to discuss test schedule, test methods, materials, chemicals and liquids required, facilities operations interface, and Owner involvement.

B. Contractor's Testing and Start-up Representative:

1. Designate and furnish one or more personnel to coordinate and expedite testing and facility start-up.

2. Representative(s) shall be present during start-up meetings and shall be available at all times during testing and start-up.

C. Provide temporary valves, gauges, piping, test equipment, and other materials and equipment required for testing and start-up.

D. Provide Subcontractor and equipment manufacturers' staff adequate to prevent delays. Schedule ongoing work so as not to interfere with or delay testing and start-up. Owner will:

1. Operate process units and facility with support of Contractor.

2. Perform necessary/required laboratory analyses.

3.02 EQUIPMENT TESTING

A. Preparation:

1. Complete installation before testing.
2. Furnish qualified manufacturers' representatives, when required by individual Specification sections.

3. Submit Manufacturer's Certificate of Proper Installation Form in accordance with requirements of the Section titled "Manufacturers' Services," when required by Specification sections.

4. Equipment Test Report Form: Provide written test report for each item of equipment to be tested, to include the minimum information:

    a. Owner/Project Name.
    b. Equipment or item tested.
    c. Date and time of test.
    d. Type of test performed (Functional or Performance).
    e. Test method.
    f. Test conditions.
    g. Test results.
    h. Signature spaces for Contractor and Engineer as witness.

5. Cleaning and Checking: Prior to beginning functional testing:

    a. Calibrate testing equipment in accordance with manufacturer's instructions.
    b. Inspect and clean equipment, devices, connected piping, and structures to ensure they are free of foreign material.
    c. Lubricate equipment in accordance with manufacturer's instructions.
    d. Turn rotating equipment by hand when possible to confirm that equipment is not bound.
    e. Open and close valves by hand and operate other devices to check for binding, interference, or improper functioning.
    f. Check power supply to electric-powered equipment for correct voltage.
    g. Adjust clearances and torque.
    h. Test piping for leaks.
    i. Ready-to-test determination will be by Owner based at least on the following:

        (1) Acceptable operation and maintenance ("O&M") data.
        (2) Notification by Contractor of equipment readiness for testing.
        (3) Receipt of Manufacturer's Certificate of Proper Installation, if so specified.
        (4) Adequate completion of work adjacent to, or interfacing with, equipment to be tested.
        (5) Availability and acceptability of manufacturer's representative, when specified, to assist in testing of respective equipment.
        (6) Satisfactory fulfillment of other specified manufacturer's responsibilities.
        (7) Equipment and electrical tagging complete.
        (8) Delivery of all spare parts and special tools.

B. Functional Testing:

1. Conduct as specified in individual Specification sections.
2. Notify Owner and Engineer in writing at least 10 days prior to scheduled date of testing.
3. Prepare Equipment Test Report summarizing test method and results.

4. When, in Engineer's opinion, equipment meets functional requirements specified, such equipment will be accepted for purposes of advancing to performance testing phase, if so required by individual Specification sections. Such acceptance will be evidenced by Engineer/Owner's signature as witness on Equipment Test Report.

C. Performance Testing:

1. Conduct as specified in individual Specification sections.
2. Notify Engineer and Owner in writing at least 10 days prior to scheduled date of test.
3. Performance testing shall not commence until equipment has been accepted by Engineer as having satisfied functional test requirements specified.
4. Type of fluid, gas, or solid for testing shall be as specified.
5. Unless otherwise indicated, furnish labor, materials, and supplies for conducting the test and taking samples and performance measurements.
6. Prepare Equipment Test Report summarizing test method and results.
7. When, in Engineer's opinion, equipment meets performance requirements specified, such equipment will be accepted as to conforming to Contract requirements. Such acceptance will be evidenced by Engineer's signature on Equipment Test Report.

3.03 START-UP OF UNIT PROCESSES

A. Prior to unit process start-up, equipment within unit process shall be accepted by Engineer as having met functional and performance testing requirements specified.

B. Start-up sequencing of unit processes shall be as chosen by Contractor to meet schedule requirements.

C. Make adjustments, repairs, and corrections necessary to complete unit process start-up.

D. Start-up shall be considered complete when, in opinion of Engineer, unit process has operated in manner intended for 5 continuous days without significant interruption. This period is in addition to functional or performance test periods specified elsewhere.

E. Significant Interruption: May include any of the following events:

1. Failure of Contractor to provide and maintain qualified on-site start-up personnel as scheduled.
2. Failure to meet specified functional operation for more than 2 consecutive hours.
3. Failure of any critical equipment or unit process that is not satisfactorily corrected within 5 hours after failure.
4. Failure of any noncritical equipment or unit process that is not satisfactorily corrected within 8 hours after failure.
5. As determined by Engineer.

F. A significant interruption will require start-up then in progress to be stopped. After corrections are made, start-up test period to start from beginning again.

3.04 FACILITY PERFORMANCE DEMONSTRATION

A. When, in the opinion of Engineer, start-up of all unit processes has been achieved, sequence each unit process to the point that facility is operational.

B. Demonstrate proper operation of required interfaces within and between individual unit processes.

C. After facility is operating, complete performance testing of equipment and systems not previously tested.

D. Document, as defined in Facility Start-up and Perfom1ance Demonstration Plan, tube performance of the facility including its computer system, until all unit processes are operable and under control of computer system.

E. Certify, on the Facility Performance Demonstration/Certification Form, that facility is capable of performing its intended function(s), including fully automatic and computerized operation.

3.05 SUPPLEMENTS

The forms listed below are part of this Section, as attached hereto:

1. Unit Process Start-up Form.
2. Facility Performance Demonstration/Certification Form.

- END OF SECTION -

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UNIT PROCESS START-UP FORM

OWNER: _____ PROJECT: _____

Unit Process Description: (Include description and equipment number of all equipment and devices):

_____

_____

_____

_____

_____

Start-up Procedure (Describe procedure for sequential start-up and evaluation, including valves to be opened/closed, order of equipment start-up, etc.):

_____

_____

_____

_____

_____

Start-up Requirements (Water, power, chemicals, etc.):

_____

_____

_____

_____

_____

Evaluation Comments:

_____

_____

_____

_____

FACILITY PERFORMANCE DEMONSTRATION/CERTIFICATION FORM

OWNER: _____ PROJECT: _____

Unit Processes Description (List unit processes involved in facility start-up):

_____

_____

_____

_____

_____

Unit Processes Start-up Sequence (Describe sequence for start-up, including computerized operations, if any):

_____

_____

_____

_____

_____

Contractor certifies that Facility is capable of performing its intended function(s), including fully automatic operation:

Contractor: _____ Date: _____
(Authorized Signature)

Engineer: _____ Date: _____
(Authorized Signature)

SECTION 02100

WASTE MATERIAL DISPOSAL

PART 1 GENERAL

1.01 SCOPE

This Section describes the disposal of waste material and salvageable material from the project site. Waste material consist of all debris due to construction operations such as clearing and grubbing (including trees, stumps, logs, brush, roots, grass, vegetation, humus, aggregates, rubbish and other objectionable matter), excavation, demolition (including rubble, broken concrete and reinforcing steel, asphaltic pavement and debris), grading, and sanitary sewer cleaning. Unless otherwise specified by the ENGINEER, the CONTRACTOR is responsible for removal and disposal of all waste materials.

1.02 RELATED SECTIONS (if utilized in this project)

SECTION 02215 – Excavating, Trenching and Backfill for Utilities
SECTION 02316 – Excavation and Backfill for Structures

1.03 SUBMITTAL

A. Obtain and submit disposal permits for proposed disposal sites if required by local ordinances.

B. Submit a copy of written permission from property owner, along with description of property prior to disposal of excess material adjacent to the Project. Submit a written and signed release from property owner upon completion of disposal work.

1.04 MEASUREMENT AND PAYMENT

Unless otherwise indicated, no separate payment will be made for waste material disposal required under this Section. Include the cost of such work as incidental to items listed in Section 00410 - Bid Form or Section 01026 - Unit Prices.

PART 2 PRODUCTS

CONTRACTOR shall utilize the appropriate equipment and materials necessary to properly dispose of waste materials.

PART 3 EXECUTION

3.01 SALVAGEABLE MATERIAL

Excavated Material: When indicated, load, haul, place, and compact excavated material from the Project at a location, or locations, shown on the Construction Plans.

3.02 EXCESS MATERIAL

A. Excess soil may be deposited on private property adjacent to the Project when written permission is obtained from property owner.

B. Vegetation, rubble, broken concrete, debris, asphaltic concrete pavement, excess soil, and other materials not designated for salvage, shall become the property of Contractor and shall be removed from the job site and disposed in a legal manner. Do not bury such material on the Project site.

C. Verify the flood plain status of any proposed disposal site. Do not dispose of excavated materials in an area designated as within the 100-year Flood Hazard Area.

D. Waste materials shall be removed from the site on a daily basis, such that the site is maintained in a neat and orderly condition.

- END OF SECTION -

SECTION 02140

CONTROL OF GROUNDWATER AND SURFACE WATER

PART 1 GENERAL

1.01 SCOPE

This section shall govern for the temporary dewatering, depressurizing, draining, pumping, bailing, and maintaining structural and trench excavations by well pointing, and provides for furnishing all labor, materials, equipment, power, incidentals and for performing all operations necessary to dewater, drain, and maintain excavations as described herein and as necessary for construction of utilities and appurtenances.

1.02 RELATED SECTIONS

SECTION 01330 – Submittals
SECTION 01340 – Shop Drawings, Product Data and Samples
SECTION 02160 – Trench Safety System

1.03 MEASUREMENT AND PAYMENT

Unless otherwise indicated, no separate payment will be made for pumping, bailing or draining of seepage or surface drainage from the work area to maintain a dry trench or excavation as required under this Section. Include the cost of such work as incidental to items listed in Section 00410 - Bid Form or Section 01026 - Unit Prices. If authorized by the ENGINEER, payment of the use of Dewatering by Well Pointing will be addressed in Section 00410 - Bid Form and Section 01026 - Unit Prices.

1.04 REFERENCES

ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft3 (600 kN-m/m3))

Federal Regulations – 29 CFR Part 1926, Standards-Excavation, Occupational Safety and Health Administration (“OSHA”)

Storm Water Management Handbook for Construction Activities prepared by City of Houston, Harris County and Harris County Flood Control District.

1.05 DEFINITIONS

A. Groundwater control includes both dewatering and depressurization of water-bearing soil layers.

1. Dewatering includes lowering the water table and intercepting seepage which would otherwise emerge from slopes or bottoms of excavations, or into tunnels and shafts,

and disposing of removed water. The intent of dewatering is to increase stability of tunnel excavations, excavated slopes, and trench walls; prevent dislocation of material from slopes, walls or bottoms of excavations; reduce lateral loads on sheeting and bracing; improve excavating and hauling characteristics of excavated material; prevent failure or heaving of the bottom of excavations; and to provide suitable conditions for placement of backfill materials and construction of structures and other installations.

2. Depressurization includes reduction in piezometric pressure within strata not controlled by dewatering alone, as required to prevent failure or heaving of excavation bottom or instability of tunnel excavations.

B. Excavation drainage includes keeping excavations free of surface and seepage water.

C. Surface drainage includes use of temporary drainage ditches and dikes and installation of temporary culverts and sump pumps with discharge lines, as required to protect the Work from any source of surface water.

D. Equipment and instrumentation for monitoring and control of the groundwater control system includes piezometers and monitoring wells and devices, such as flow meters, for observing and recording flow rates.

1.06 PERFORMANCE REQUIREMENTS

A. Conduct subsurface investigations to identify groundwater conditions and to provide parameters for design, installation, and operation of groundwater control systems.

B. Design a groundwater control system compatible with requirements of Federal Regulations 29 CFR Part 1926, to produce the following results:

1. Effectively reduce the hydrostatic pressure affecting excavations.

2. Develop a substantially dry and stable subgrade for subsequent construction operations.

3. Preclude damage to adjacent properties, buildings, structures, utilities, installed facilities, and other work.

4. Prevent the loss of fines, seepage, boils, quick condition, or softening of the foundation strata.

5. Maintain stability of sides and bottom of excavations.

C. Provide groundwater control systems when the groundwater level is less than 2 feet below the bottom of the excavation and when approved by the ENGINEER. Systems may include single-stage or multiple-stage well point systems, eductor and ejector-type systems, deep wells, or combinations of these equipment types.

D. Provide drainage of seepage water and surface water, as well as water from any other source entering the excavation. Excavation drainage may include placement of drainage materials, such as crushed stone and filter fabric, together with sump pumping.

E. Provide ditches, berms, pumps, and other methods necessary to divert and drain surface water from excavation and other work areas.

F. Locate groundwater control and drainage systems so as not to interfere with utilities, construction operations, adjacent properties, or adjacent water wells.

G. Assume sole responsibility for groundwater control systems and for any loss or damage resulting from partial or complete failure of protective measures and any settlement or resultant damage caused by the groundwater control operations. Modify groundwater control systems or operations if they cause or threaten to cause damage to new construction, existing site improvements, adjacent property, or adjacent water wells, or affect potentially contaminated areas. Repair damage caused by groundwater control systems or resulting from failure of the system to protect property as required.

H. Provide an adequate number of piezometers installed at the proper locations and depths as required to provide meaningful observations of the conditions affecting the excavation, adjacent structures, and water wells.

I. Provide environmental monitoring wells installed at the proper locations and depths as required to provide adequate observations of hydrostatic conditions and possible contaminant transport from contamination sources into the work area or into the groundwater control system.

J. Decommission piezometers and monitoring wells installed during design phase studies and left for the CONTRACTOR's monitoring and use.

K. The CONTRACTOR shall provide protection of persons and property by at least:

1. Barricading open excavations occurring as part of this work and post with warning lights. Operate warning lights during the hours from dusk to dawn, each day. All barricades, signs and other types of devices shall be installed in accordance with the "Texas Manual on Uniform Traffic Control Devices".

2. Protect structures, utilities, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by temporary dewatering system installation and operation.

L. The CONTRACTOR shall restore all streets, driveways, curbs, sidewalks and other existing items to a condition as good as or better than existed before work was commenced, at no additional cost to the OWNER.

1.07 SUBMITTAL

A. Prior to construction, if Dewatering by Well Pointing is authorized by the Engineer, submit a Groundwater Control Plan for review. The plan shall be signed by a Professional Engineer registered in the State of Texas and should include the following:

1. Results of subsurface investigation and description of the extent and characteristics of water-bearing layers subject to groundwater control.

2. Names of equipment suppliers and installation subcontractors.

3. A description of proposed groundwater control systems indicating arrangement, location, depth and capacities of system components, installation details and criteria, and operation and maintenance procedures.

4. A description of proposed monitoring and control system indicating depths and locations of piezometers and monitoring wells, monitoring installation details and criteria, and type of equipment and instrumentation with pertinent data and characteristics.

5. A description of proposed filters including types, sizes, capacities, and manufacturer's application recommendations.

6. Design calculations demonstrating adequacy of proposed systems for intended applications. Define potential area of influence of groundwater control operation near contaminated areas, if applicable.

7. Operating requirements, including piezometric control elevations for dewatering and depressurization.

8. Excavation drainage methods including typical drainage layers, sump pump application, and other necessary means.

9. Surface water control and drainage installations.

10. Proposed methods and locations for disposing of removed water.

B. If directed by ENGINEER, submit the following records upon completing initial installation:

1. Installation and development reports for well points, eductors, and deep wells.

2. Installation reports and baseline readings for piezometers and monitoring wells.

3. Baseline analytical test data of water from monitoring wells.

4. Initial flow rates.

C. If directed by ENGINEER, submit the following records on a weekly basis during operations:

1. Records of flow rates and piezometric elevations obtained during monitoring of dewatering and depressurization.

2. Maintenance records for groundwater control installations, piezometers, and monitoring wells.

D. If directed by ENGINEER, submit (at end of work) decommissioning (abandonment) reports for monitoring wells and piezometers installed by others during the design phase and left for CONTRACTOR's monitoring and use.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Comply with requirements of agencies having jurisdiction.

B. Obtain all necessary permits from agencies with control over the use of groundwater and matters affecting well installation, water discharge, and use of existing storm drains and natural water sources. Because the review and permitting process may be lengthy, take early action to pursue and submit for the required approvals.

C. Monitor groundwater discharge for contamination while performing pumping in the vicinity of potentially contaminated sites.

1.09 QUALITY ASSURANCE

A. The dewatering system work (Eductors, well points, or deep wells), shall be furnished, installed, and operated by an experienced CONTRACTOR regularly engaged in groundwater control system design, installation, and operation, which has at least five (5) years of successful experience in the field of dewatering.

B. The CONTRACTOR or well pointing firm shall engage a qualified surveyor, to perform all layouts and measurements. The surveyor shall layout the work to the lines and grades required before installation and shall determine the location of each well point, piezometer and other data, as required.

C. The surveyor shall record and maintain all information pertinent to each well point and piezometer.

D. The temporary dewatering system shall be the minimum system required for controlling groundwater and depressurization, regardless of source. The installed system shall be capable of lowering and maintaining the groundwater to at least 5 feet below the bottom of the excavation and operated as for the length of time specified in Paragraph 3.02.E. Within these limits, the CONTRACTOR shall be responsible for the design of the entire temporary dewatering system and shall make whatever modifications and additions necessary for the system to fulfill its requirements.

E. Equipment and materials are at the option of CONTRACTOR as necessary to achieve desired results for dewatering. Selected equipment and materials are subject to review by ENGINEER through submittals required in Paragraph 1.06 of this Section.

F. All equipment must be in good repair and operating order.

G. Sufficient standby equipment and materials shall be kept available to ensure continuous operation, where required.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 GROUNDWATER CONTROL

A. Perform a subsurface investigation by borings (test holes) as necessary to identify water-bearing layers, piezometric pressures, and soil parameters for design and installation of groundwater control systems. Perform pump tests, if necessary, to determine the drawdown characteristics of the water-bearing layers. The results shall be presented in the Groundwater and Surface Water Control Plan.

B. Provide labor, material, equipment, techniques, and methods to lower, control, and handle groundwater in a manner compatible with construction methods and site conditions. Monitor effectiveness of the installed system and its effect on adjacent property.

C. Install, operate, and maintain groundwater control systems in accordance with the Groundwater Control Plan. Notify ENGINEER in writing of any changes made to accommodate field conditions and changes to the Work. Provide revised drawings and calculations with such notification.

D. Provide for continuous system operation, including nights, weekends, and holidays. Arrange for appropriate backup if electrical power is primary energy source for dewatering system.

E. Monitor operations to verify that the system lowers groundwater piezometric levels at a rate required to maintain a dry excavation resulting in a stable subgrade for prosecution of subsequent operations.

F. Where hydrostatic pressures in confined water-bearing layers exist below excavation, depressurize those zones to eliminate risk of uplift or other instability of excavation or installed works. Allowable piezometric elevations shall be defined in the Groundwater Control Plan.

G. Remove groundwater control installations:

1. Remove pumping system components and piping when groundwater control is no longer required.

2. Remove piezometers, including piezometers installed during the design phase investigations and left for CONTRACTOR's use, upon completion of testing.

3. Remove monitoring wells when directed by the ENGINEER.

4. Grout abandoned well and piezometer holes. Fill piping that is not removed with cement-bentonite grout or cement-sand grout.

H. During backfilling, dewatering may be reduced to maintain water level a minimum of 5 feet below prevailing level of backfill. However, do not allow that water level to result in uplift pressures in excess of 80% of downward pressure produced by weight of structure or backfill in place. Do not allow water levels to rise into cement-stabilized sand until at least 48 hours after placement.

I. Provide a uniform diameter for each pipe drain run constructed for dewatering. Remove pipe drain when it has served its purpose. If removal of pipe is impractical, provide grout connections at 50-foot intervals and fill pipe with cement-bentonite grout or cement-sand grout when pipe is removed from service.

J. Extent of construction groundwater control for structures with a permanent perforated underground drainage system may be reduced, such as for units designed to withstand hydrostatic uplift pressure. Provide a means of draining the affected portion of underground system, including standby equipment. Maintain drainage system during operations and remove it when no longer required.

K. Remove system upon completion of construction or when dewatering and control of surface or groundwater is no longer required.

L. Unless otherwise specified, compact backfill to not less than 95% of the maximum dry density in accordance with ASTM D698.

3.02 REQUIREMENTS FOR EDUCTOR, WELL POINTS, OR DEEP WELLS

A. For above-ground piping in groundwater control system, include a 12-inch minimum length of clear, transparent piping between every eductor well or well point and discharge header so that discharge from each installation can be visually monitored.

B. Install sufficient piezometers or monitoring wells to show that all trench or shaft excavations in water-bearing materials are pre-drained prior to excavation. Provide separate piezometers for monitoring of dewatering and for monitoring of depressurization. Install piezometers and monitoring wells for tunneling as appropriate for CONTRACTOR's selected method of work.

C. Install piezometers or monitoring wells not less than 1 week in advance of beginning the associated excavation.

D. Dewatering may be omitted for portions of underdrains or other excavations, but only where auger borings and piezometers or monitoring wells show that soil is pre-drained by an existing system such that the criteria of the groundwater control plan are satisfied.

E. Operate well points for at least 24 hours before excavating and at least 24 hours after backfilling excavations.

F. All combustion-type engine drivers used for pumping shall have a mufflered exhaust system to reduce noise and shall be located as far from existing homes or businesses as practical.

G. Replace installations that produce noticeable amounts of sediment.

H. Provide additional groundwater control installations, or change the methods, in the event that the installations (according to the groundwater control plan) do not provide satisfactory results based on the performance criteria defined by the plan and by the specification. Submit a revised plan according to Paragraph 1.05 of this Section.

3.03 EXCAVATION DRAINAGE

CONTRACTOR may use excavation drainage methods if necessary to achieve well drained conditions. The excavation drainage may consist of a layer of crushed stone and filter fabric and sump pumping in combination with sufficient wells for groundwater control to maintain stable excavation and backfill conditions.

3.04 MAINTENANCE AND OBSERVATION

A. Conduct daily maintenance and observation of piezometers or monitoring wells while the groundwater control installations (or excavation drainage) are operating in an area or seepage into tunnel is occurring. Keep system in good condition.

B. Replace damaged and destroyed piezometers or monitoring wells with new piezometers or wells as necessary to meet observation schedule.

C. Cut off piezometers or monitoring wells in excavation areas where piping is exposed, only as necessary to perform observation as excavation proceeds. Continue to maintain and make observations, as specified.

D. Remove and grout piezometers inside or outside the excavation area when groundwater control operations are complete. Remove and grout monitoring wells when directed by the ENGINEER.

3.05 MONITORING AND RECORDING

A. Monitor and record average flow rate of operation for each deep well, or for each well point or eductor header used in dewatering system. Also monitor and record water level and

groundwater recovery. These records shall be obtained daily until steady conditions are achieved, and twice weekly thereafter.

B. Observe and record elevation of water level daily as long as groundwater control system is in operation, and weekly thereafter until the Work is completed or piezometers or wells are removed, except when ENGINEER determines that more frequent monitoring and recording is required. Comply with ENGINEER's direction for increased monitoring and recording and take measures as necessary to ensure effective dewatering for intended purpose.

3.06 SURFACE WATER CONTROL

A. Intercept surface water and divert it away from excavations through use of dikes, ditches, curb walls, pipes, sumps, or other approved means. The requirement includes temporary works required to protect adjoining properties from surface drainage caused by construction operations.

B. Divert surface water and seepage water into sumps and pump it into drainage channels or storm drains, when approved by agencies having jurisdiction. Provide settling basins when required by such agencies.

3.07 SOUND ABATEMENT

Where dewatering is required adjacent to existing residential units, Contractor shall take steps to reduce the sound pressure from the pumps or generators to exceed no greater than 50 decibels at the property line (generally equivalent to a quiet office). This can be accomplished by providing earthen berms around the equipment, erection of wood walls, improved muffler on the equipment or other sound dampening measures.

- END OF SECTION –

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SECTION 02215

EXCAVATING, TRENCHING AND BACKFILL FOR UTILITIES

PART 1 GENERAL

1.01 SCOPE

This Section covers excavation, trenching foundation, embedment, and backfill for storm sewers, water distribution facilities, sanitary sewer force mains, sanitary sewers and other utility systems and appurtenances. A trench safety system shall be required for all excavation at depths of five (5) feet and greater.

1.02 RELATED SECTIONS

SECTION 01330 – Submittals
SECTION 01340 – Shop Drawings, Product Data and Samples
SECTION 01410 – Testing Laboratory Services
SECTION 02100 – Waste Material Disposal
SECTION 02140 – Control of Groundwater and Surface Water
SECTION 02160 – Trench Safety Systems
SECTION 02320 – Backfill Materials
SECTION 02321 – Cement Stabilized Sand Backfill
SECTION 02740 – Sanitary Sewer Facilities
SECTION 02745 – Sanitary Force Main

1.03 REFERENCED STANDARDS

CONTRACTOR shall refer to the latest issuance of the standards listed below.

ASTM C12 - Standard Practice for Installing Vitrified Clay Pipe Lines.
ASTM C94 - Standard Specification for Ready-Mixed Concrete
ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C150 - Standard Specification for Portland Cement
ASTM C494 - Standard Specification for Chemical Admixtures for Concrete
ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for use in Concrete
ASTM D558 - Standard Test Methods for Moisture-Density Relations of Soil Cement Mixtures.
ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft).
ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.
ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.
ASTM D2487 - Standard Classification of Soils for Engineering Purposes.
ASTM D2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
TxDOT Tex-101-E - Preparing Soil and Flexible Base Materials for Testing.
TxDOT Tex-110-E - Particle Size Analysis of Soils.
Federal Regulations, 29 CFR Part 1926, Standards-Excavation, Occupational Safety and Health Administration (OSHA).
ASTM C76- Standard Specification for Reinforced Concrete Culverts, Storm Drain, and Sewer Pipe.

1.04 SUBMITTALS

A. If required by the ENGINEER, submit proposed methods, equipment, materials, and sequence of operations for utility construction in accordance with Section 01330 - Submittals and under the provisions of SECTION 01340 – Shop Drawings, Product Data and Samples. Plan construction to minimize disruption of existing utilities or adjacent property.

B. Submit planned typical method of excavation, backfill placement and compaction including:

1. Trench widths.

2. Procedures for foundation and pipe zone bedding placement, and trench backfill compaction.

C. Procedures for assuring compaction against undisturbed soil when pre-manufactured trench safety systems are proposed.

1. Submit backfill material sources and product quality information in accordance with requirements of Section 02320 - Backfill Materials.

2. Submit trench excavation safety program in accordance with requirements of Section 02160 Trench Safety System. Include designs for special shoring meeting requirements defined in Paragraph 1.08, Special Shoring Design Requirements contained herein.

3. Submit record of location of utilities as installed, referenced to survey control points. Include locations of utilities encountered or rerouted. Give stations, horizontal dimensions, elevations, inverts, and gradients.

1.05 QUALITY ASSURANCE

A. Testing and analysis of backfill materials for soil classification and compaction during construction will be performed by an independent laboratory provided by OWNER in accordance with requirements of Section 01410 - Testing Laboratory Services and as specified in Paragraph 3.09 of this Section, unless otherwise directed by the ENGINEER.

B. Perform backfill material source qualification testing in accordance with requirements of Section 02320 - Backfill Materials.

C. If, during progress of work, tests indicate that compacted materials do not pass specified requirements, work shall be removed, replaced and re-tested at no cost to OWNER.

D. Field moisture/density tests will be performed for each lift of bedding and backfill material at intervals off 500 feet measured along the trench centerline, and/or at least one point between all manholes (for sanitary projects), whichever is more frequent, unless specified otherwise on the construction plans or unless otherwise directed by the ENGINEER.

1.06 SCHEDULING

Schedule work so that pipe embedment can be completed on same day that acceptable foundation has been achieved for each section of pipe installation, manhole, or other structures.

1.07 SPECIAL SHORING DESIGN REQUIREMENTS

Have special shoring designed or selected by Contractor's Professional Engineer to provide support for sides of excavations, including soils and hydrostatic ground water pressures as applicable, and to prevent ground movements affecting adjacent installations or improvements such as structures, pavements and utilities. Special shoring may be a premanufactured system selected by Contractor's Professional Engineer to meet project site requirements based on manufacturer's standard design.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Perform excavation with hydraulic excavator or other equipment suitable for achieving requirements of this Section.

B. Use only hand-operated tamping equipment until minimum cover of 12 inches is obtained over pipes, conduits, and ducts. Do not use heavy compacting equipment until adequate cover is attained to prevent damage to pipes, conduits, or ducts.

C. Use trench shields or other protective systems or shoring systems which are designed and operated to achieve placement and compaction of backfill directly against undisturbed native soil. Use special shoring systems where required which may consist of braced sheeting, braced soldier piles and lagging, slide rail systems, or other systems meeting requirements as specified in Paragraph 1.07, Special Shoring Design Requirements.

2.02 BACKFILL MATERIAL

Conform to classifications and product descriptions of Section 02320 - Backfill Materials.

2.03 Flowable Fill (when required)

1. Provide material conforming to:

A. Cement – ASTM C150, Type 1

B. Fly Ash – ASTM C618, Class C with a minimum CaO content of 20 percent

C. Water – ASTM C94

D. Fine Aggregate – Natural or manufactured fine aggregate, or a combination thereof, free from deleterious amounts of salt, alkali, vegetable matter or other objectionable material. The plasticity index shall be 4 or less when tested with ASTM D4318. Organic impurities, when tested in accordance with ASTM C40, shall not show a color darker than the standard color. It is intended that the fine aggregate be fine enough to stay in suspension in the mortar to the extent required for proper flow. The fine aggregate shall conform to the following gradation:

Sieve Size	Percent Passing
3/8 inch	100
No. 200	0-10

If flowable mixture cannot be produced, the fine aggregate may not be approved.

E. Admixtures – ASTM C260 and / or C494

2. Mix Design

A. Mix design shall include the mix design number or code designation to order concrete from the supplier and the 7-day design strength. It shall also include the type and brand of Cement, Fly Ash and Admixtures and the proportions of each material used.

B. Minimum strength requirement is 100 psi in 7 days unless otherwise as noted on plans.

PART 3 EXECUTION

3.01 STANDARD PRACTICE

F. Install flexible pipe, including "semi-rigid" pipe, to conform to standard practice described in ASTM D2321, and as described in this Section. Where an apparent conflict occurs between standard practice and requirements of this Section, this Section governs.

B. Install rigid pipe to conform to standard practice described in ASTM C12 or C76 as applicable, and as described in this Section. Where an apparent conflict occurs between standard practice and requirements of this Section, this Section governs.

3.02 PREPARATION

A. Establish traffic control. Set up necessary street detours and barricades in preparation for excavation if construction will affect traffic. Maintain barricades and warning devices at all times for streets and intersections where work is in progress, or where affected by Work, and is considered hazardous to traffic movements.

B. Perform work to conform to applicable OSHA safety standards and regulations. Employ trench safety system as specified in Section 02160 - Trench Safety Systems. Provide adequate safety measures to prevent unauthorized persons or vehicles from entering or falling into any excavation.

C. Immediately notify agency or company owning any existing utility line which is damaged, broken, or disturbed. Obtain approval from ENGINEER and agency for any repairs or relocations, either temporary or permanent.

D. Remove existing pavements and structures, including sidewalks and driveways as applicable.

E. Install and operate necessary dewatering and surface-water control measures to conform to Section 02140 - Control of Groundwater and Surface Water. Provide stable trench to allow installation in accordance with Specifications.

F. Maintain permanent benchmarks, monumentation, and other reference points. Unless otherwise directed in writing, replace those which are damaged or destroyed.

3.03 CRITICAL LOCATION INVESTIGATION

A. Horizontal and vertical location of various underground lines shown on Construction Plans, including but not limited to water lines, gas lines, storm sewers, sanitary sewers, telecommunication lines, electric lines or power ducts, pipelines, concrete and debris, are based on best information available but are only approximate locations. At Critical Locations shown on the Construction Plans, field verify horizontal and vertical locations of such lines within a zone 2 feet vertically and 4 feet horizontally of proposed work.

1. Verify location of existing utilities minimum of 7 working days in advance of pipe laying activities based on daily pipe laying rate or prior to beginning installation of auger pit or tunnel shaft. Use extreme caution and care when uncovering utilities.

2. Notify ENGINEER immediately upon identification of obstruction.

B. Notify involved utility companies of date and time that investigation excavation will occur and request that their respective utility lines be marked in field. Comply with utility or pipeline company requirements that their representative be present during excavation. Provide ENGINEER with 48 hours' notice prior to field excavation or related work.

3.04 PROTECTION

A. Protect trees, shrubs, lawns, existing structures, and other permanent objects outside of grading limits and within grading limits as designated on Drawings.

B. Protect and support above-grade and below-grade utilities which are to remain.

C. Restore damaged permanent facilities to pre-construction conditions unless replacement or abandonment of facilities is indicated on Construction Plans.

D. Take measures to minimize erosion of trenches. Do not allow water to pond in trenches. Where slides, washouts, settlements, or areas with loss of density or pavement failures or potholes occur, repair, re-compact, and pave those areas at no additional cost to OWNER.

3.05 EXCAVATION

A. Before excavating, strip topsoil from areas to be excavated and stockpile material as specified in the Section 02120 - Stripping, Stockpiling, and Placing Topsoil.

B. Except as otherwise specified or shown on Construction Plans, install underground utilities in open cut trenches with vertical sides with trenching machine, backhoe or by hand operation.

C. Perform excavation work so that pipe, conduit, and ducts can be installed to depths and alignments shown on Construction Plans. Avoid disturbing surrounding ground and existing facilities and improvements.

D. Determine trench excavation widths using following schedule as related to pipe outside diameter (O.D.). Excavate trench so that pipe is centered in trench.

Nominal Pipe Size, Inches	Minimum Trench Width, Inches
Less than 18	O.D. + 18
18 to 30	O.D. + 24
36 to 42	O.D. + 36
Greater than 42	O.D. + 48

Do not obstruct sight distance for vehicles utilizing roadway or detours with stockpiled materials.

E. Use sufficient trench width or benches above embedment zone for installation of well point headers or manifolds and pumps where depth of trench makes it uneconomical or impractical to pump from surface elevation. Provide sufficient space between shoring cross braces to permit equipment operations and handling of forms, pipe, embedment and backfill, and other materials.

F. Upon discovery of unknown utilities, badly deteriorated utilities not designated for removal, or concealed conditions, discontinue work at that location. Notify ENGINEER and obtain instructions before proceeding.

G. A trench safety system shall be required in accordance with Section 02160 - Trench Safety System for all excavations at depths over 5 feet.

1. When trench shield (trench box) is used as worker safety device, the following requirements apply:

    a. Make trench excavations of sufficient width to allow shield to be lifted or pulled freely, without damage to trench sidewalls.

    b. Move trench shields so that pipe, and backfill materials, after placement and compaction, are not damaged nor disturbed, nor degree of compaction reduced. Re-compact after shield is moved if soil is disturbed.

    c. When required, place, spread, and compact pipe foundation and bedding materials beneath shield. For backfill above bedding, lift shield as each layer of backfill is placed and spread. Place and compact backfill materials against undisturbed trench walls and foundation.

    d. Maintain trench shield in position to allow sampling and testing to be performed in safe manner.

    e. Conform to applicable State and Federal regulations.

2. Other Methods for Shoring of Trench Walls.

    a. Install Special Shoring in advance of trench excavation or simultaneously with trench excavation, so that soils within full height of trench excavation walls will remain laterally supported at all times.

    b. For all types of shoring, support trench walls in pipe embedment zone throughout installation. Provide trench wall supports sufficiently tight to prevent washing trench wall soil out from behind trench wall support.

    c. Leave sheeting driven into or below pipe embedment zone in place to preclude loss of support of foundation and embedment materials, unless otherwise directed by ENGINEER. Leave rangers, walers, and braces in place as long as required to support sheeting, which has been cut off, and trench wall in vicinity of pipe zone.

    d. Employ special methods for maintaining integrity of embedment or foundation material. Before moving supports, place and compact embedment to sufficient depths to provide protection of pipe and stability of trench walls. As supports are moved, finish placing and compacting embedment.

    e. If sheeting or other shoring is used below top of pipe embedment zone, do not disturb pipe foundation and embedment materials by subsequent removal. Maximum thickness of removable sheeting extending into embedment zone shall

be equivalent of 1-inch-thick steel plate. As sheeting is removed, fill in voids left with grouting material.

H. Voids under paving area outside shield caused by CONTRACTOR's work will require removal of pavement, consolidation and replacement of pavement in accordance with Contract Documents. Repair damage resulting from failure to provide adequate supports.

I. Place sand or soil behind shoring or trench shield to prevent soil outside shoring from collapsing and causing voids under pavement. Immediately pack suitable material in outside voids following excavation to avoid caving of trench walls.

J. Coordinate excavation within 15 feet of pipeline with company's representative. Support pipeline with methods agreed to by pipeline company's representative. Use small, rubber-tired excavator, such as backhoe, to do exploratory excavation. Bucket that is used to dig in close proximity to pipelines shall not have teeth or shall have guard installed over teeth to approximate bucket without teeth. Excavate by hand within 1 foot of Pipeline Company's line. Do not use larger excavation equipment than normally used to dig trench in vicinity of pipeline until pipelines have been uncovered and fully exposed. Do not place large excavation and hauling equipment directly over pipelines unless approved by Pipeline Company's representative.

K. When, during excavation to uncover pipeline company's pipelines, screwed collar or an oxy-acetylene weld is exposed, immediately notify ENGINEER. Provide supports for collar or welds. Discuss with Pipeline Company's representative and determine methods of supporting collar or weld during excavation and later backfilling operations. When collar is exposed, request Pipeline Company to provide welder in a timely manner to weld ends of collar prior to backfilling of excavation.

3.06 HANDLING EXCAVATED MATERIALS

A. Use only excavated materials, which are suitable as defined in this Section and conforming to Section 02320 - Backfill Materials. Place material suitable for backfilling in stockpiles at distance from trench to prevent slides or cave-ins.

B. When required, provide additional backfill material conforming to requirements of Section 02320 - Backfill Materials.

C. Do not place stockpiles of excess excavated materials on streets and adjacent properties. Protect backfill material to be used on site. Maintain site conditions in accordance with Section 01500 - Temporary Facilities and Controls. Excavate trench so that pipe is centered in trench. Do not obstruct sight distance for vehicles utilizing roadway or detours with stockpiled materials.

3.07 TRENCH FOUNDATION

A. Excavate bottom of trench to uniform grade to achieve stable trench conditions and satisfactory compaction of foundation or bedding materials.

B. When wet soil is encountered on trench bottom and dewatering system is not required, over excavate an additional 6 inches with approval by ENGINEER. Place non-woven geotextile fabric and then compact 12 inches of crushed stone in one lift on top of fabric. Compact crushed stone with four passes of vibratory-type compaction equipment.

C. Perform over excavation, if directed. Removal of unstable or unsuitable material may be required if approved by ENGINEER:

   1. Even though CONTRACTOR has not determined material to be unsuitable, or

   2. If unstable trench bottom is encountered and an adequate ground water control system is installed and operating according to Section 02140 - Control of Ground Water and Surface Water.

D. Place trench dams in Class I foundations in line segments longer than 100 feet between manholes and not less than one in every 500 feet of pipe placed. Install additional dams as needed to achieve workable construction conditions. Do not place trench dams closer than 5 feet from manholes.

3.08 PIPE EMBEDMENT, PLACEMENT, AND COMPACTION

A. Remove loose, sloughing, caving, or otherwise unsuitable soil from bottoms and sidewalls of trenches immediately prior to placement of embedment materials.

B. Place embedment including bedding, haunching, and initial backfill as shown on Construction Plans.

C. For pipe installation, manually spread embedment materials around pipe to provide uniform bearing and side support when compacted. Protect flexible pipe from damage during placing of pipe zone bedding material. Perform placement and compaction directly against undisturbed soils in trench sidewalls, or against sheeting which is to remain in place.

D. Do not place trench shields or shoring within height of embedment zone unless means to maintain density of compacted embedment material are used. If moveable supports are used in embedment zone, lift supports incrementally to allow placement and compaction of material against undisturbed soil.

E. Place geotextile to prevent particle migration from in-situ soil into open-graded (Class I) embedment materials or drainage layers.

F. Do not damage coatings or wrappings of pipes during backfilling and compacting operations. When embedding coated or wrapped pipes, do not use crushed stone or other sharp, angular aggregates.

G. Place haunching material manually around pipe and compact it to provide uniform bearing and side support. If necessary, hold small-diameter or lightweight pipe in place during

compaction of haunch areas and placement beside pipe with sand bags or other suitable means.

H. Place electrical conduit, if used, directly on foundation without bedding.

I. Shovel in-place and compact embedment material using pneumatic tampers in restricted areas, and vibratory-plate compactors or engine-powered jumping jacks in unrestricted areas. Compact each lift before proceeding with placement of next lift. Water tamping is not allowed.

J. For water lines construction embedment, use bank run sand, concrete sand, gem sand, pea gravel, or crushed limestone as specified in Section 02320 - Backfill Material. Adhere to the following subparagraph numbers 1 and 2.

1. Class I, II and III Embedment Materials:

b. Maximum 6 inches compacted lift thickness.

c. Compact to achieve minimum of 95 percent of maximum dry density as determined according to ASTM D698.

d. Moisture content to be within -3 percent to +5 percent of optimum as determined according to ASTM D698, unless otherwise approved by ENGINEER.

2. Cement Stabilized Sand (where required for special installations):

a. Maximum 6 inches compacted thickness.

b. Compact to achieve minimum of 95 percent of maximum dry density as determined according to ASTM D698.

c. Moisture content to be on dry side of optimum as determined according to ASTM D 698 but sufficient for effective hydration.

K. For Sanitary Sewers, adhere to subparagraph number 1 and 2 below. For Storm Sewers, provide cement stabilized sand per subparagraph 2. This provision does not apply to Storm Sewers constructed of HDPE pipe installed under pavement.

1. Class I Embedment Materials.

a. Maximum 6-inches compacted lift thickness.

b. Systematic compaction by at least two passes of vibrating equipment. Increase compaction effort as necessary to effectively embed pipe to meet deflection test criteria.

c. Moisture content as determined by CONTRACTOR for effective compaction without softening soil of trench bottom, foundation or trench walls.

2. Class II Embedment and Cement Stabilized Sand.

    a. Maximum 6-inches compacted thickness.

    b. Compaction by methods determined by CONTRACTOR to achieve minimum of 95 percent of maximum dry density as determined according to ASTM D698 for Class II materials and according to ASTM D558 for cement stabilized materials.

    c. Moisture content of Class II materials within 3 percent of optimum as determined according to ASTM D 698. Moisture content of cement stabilized sands on dry side of optimum as determined according to ASTM D558 but sufficient for effective hydration.

L. For Storm Sewers constructed of HDPE pipe and installed under pavement, provide and set flowable fill pipe embedment as follows.

1. Batch, mix and transport flowable fill in accordance to ASTM C94.

2. Mix flowable fill in quantities required for immediate use. Do not use portions which have developed initial set or which are not in place within 90 minutes after initial water has been added.

3. Do not mix flowable fill while air is at or below 35 degrees F.

4. Monitor and control the fluid pressure during placement of flowable fill prior to set. Take appropriate measures to avoid excessive pressure that may damage or displace pavement or cause floatation.

M. Place trench dams in Class I embedment in line segments longer than 100 feet between manholes, and not less than one in every 500 feet of pipe placed. Install additional dams as needed to achieve workable construction conditions. Do not place trench dams closer than 5 feet from manholes.

3.09 TRENCH ZONE BACKFILL PLACEMENT AND COMPACTION

A. Place backfill for pipe or conduits and restore surface as soon as practicable. Leave only minimum length of trench open as necessary for construction.

B. For water lines, under pavement and to within one foot back of curb, use backfill materials described below:

1. For water lines 20 inches in diameter and smaller, use bank run sand or select backfill materials up to pavement base or subgrade.

2. For water lines 24 inches in diameter and larger, backfill with suitable on-site material (random backfill) up to 12 inches below pavement base or subgrade. Place minimum of 12 inches of select backfill below pavement base or subgrade.

C. For sewer pipes (Storm and Sanitary), use backfill materials described by trench limits. For "trench zone backfill" under pavement and to within one foot back of curb, use cement stabilized sand for pipes of nominal sizes 36 inches in diameter and smaller to level 12 inches below the pavement. For sewer pipes 42 inches in diameter and larger, under pavement or natural ground, backfill from 12 inches above top of pipe to 12 inches below pavement with suitable on-site material or select backfill. Use select backfill for rigid pavements or flexible base material for asphalt pavements for 12- inch backfill directly under pavement. For backfill materials reference Section 02320 - Backfill Materials. This provision does not apply where a Storm Sewer is constructed of HDPE pipe.

D. For Storm Sewers constructed of HDPE pipe and installed under pavement provide flowable fill as specified in Paragraph 3.08 L of this Section. For Storm Sewers constructed of HDPE pipe and not installed under pavement provide cement stabilized sand.

E. Where damage to completed pipe installation work is likely to result from withdrawal of sheeting, leave sheeting in place. Cut off sheeting 1.5 feet or more above crown of pipe. Remove trench supports within 5 feet from ground surface.

F. Unless otherwise shown on Drawings. Use one of the following trench zone backfills under pavement and to within one foot of edge of pavement. Place trench zone backfill in lifts and compact. Fully compact each lift before placement of next lift.

1. Class I, II, or III or combination thereof:

    a. Place in maximum 12-inch thick loose layers.

    b. Compact by vibratory equipment to minimum of 95 percent of maximum dry density determined according to ASTM D 698.

    c. Moisture content within zero percent to 5 percent above optimum determined according to ASTM D698, unless otherwise approved by ENGINEER.

2. Cement-Stabilized Sand:

    a. Maximum lift thickness determined by CONTRACTOR to achieve uniform placement and required compaction, but do not exceed 12 inches.

    b. Compact by vibratory equipment to minimum of 95 percent of maximum dry density determined according to ASTM D558.

    c. Moisture content on dry side of optimum determined according to ASTM D558 but sufficient for cement hydration.

3. Class IVA and IVB (Clay Soils):

    a. Place in maximum 8-inch thick loose lifts.

b. Compaction by vibratory Sheepsfoot roller to minimum of 95 percent of maximum dry density determined according to ASTM D698.

c. Moisture content within zero percent to 5 percent above optimum determined according to ASTM D698, unless approved by ENGINEER.

G. Unless otherwise shown on Drawings, for trench excavations not under pavement, random backfill of suitable material may be used in trench zone. This provision does not apply to HDPE storm sewers.

1. Fat clays (CH) may be used as trench zone backfill outside paved areas at CONTRACTOR's option. When required density is not achieved, rework, dry out, use lime stabilization or other approved methods to achieve compaction requirements at no additional cost to OWNER, or use different suitable material.

2. Maximum 9-inch compacted lift thickness for clayey soils and maximum 12-inch lift thickness for granular soils.

3. Compact to minimum of 90 percent of maximum dry density determined according to ASTM D698.

4. Moisture content as necessary to achieve density.

H. For electric conduits, remove form work used for construction of conduits before placing trench zone backfill.

3.10 MANHOLES, JUNCTION BOXES AND OTHER PIPELINE STRUCTURES

A. Below paved areas or where shown on Drawings, encapsulate manhole with cement stabilized sand; minimum of 2 foot below base, minimum 2 foot around walls, up to pavement subgrade or natural ground. Compact in accordance with Paragraph 3.09.F.2 of this Section

B. In unpaved areas, use select fill for backfill. Existing material that qualifies as select material may be used, unless indicated otherwise on Drawings. Deposit backfill in uniform layers and compact each layer as specified. Maintain backfill material at no less than 2 percent below nor more than 5 percent above optimum moisture content, unless otherwise approved by ENGINEER. Place fill material in uniform 8-inch maximum loose layers. Compact fill to at least 95 percent of maximum Standard Proctor Density according to ASTM D698.

C. For water line projects 24-inch and greater, encapsulate manhole with cement stabilized sand; minimum of 1 foot below base, minimum of 2 feet around walls, up to within 12 inches of pavement subgrade or natural ground. For manholes over water line, extend encapsulation to bottom of trench. Compact in accordance with Paragraph 3.09 F.2 of this Section.

3.11 FIELD QUALITY CONTROL

A. Test for material source qualifications as defined in Section 02320 - Backfill Materials.

B. Provide excavation and trench safety systems at locations and to depths required for testing and retesting during construction at no additional cost to OWNER.

C. Tests will be performed on minimum of three different samples of each material type for plasticity characteristics, in accordance with ASTM D 4318, and for gradation characteristics, in accordance with Tex-101-E and Tex-110-E. Additional classification tests will be performed whenever there is noticeable change in material gradation or plasticity, or when requested by ENGINEER.

D. At least three tests for moisture-density relationships will be performed initially for backfill materials in accordance with ASTM D698, and for cement- stabilized sand in accordance with ASTM D 558. Perform additional moisture-density relationship tests once a month or whenever there is noticeable change in material gradation or plasticity.

E. In-place density tests of compacted pipe foundation, embedment and trench zone backfill soil materials will be performed according to ASTM D1556, or ASTM D2922 and ASTM D3017, and at following frequencies and conditions.

1. For open cut construction projects and auger pits: Unless otherwise approved by ENGINEER, successful compaction to be measured by one test per 40 linear feet measured along pipe for compacted embedment and two tests per 40 linear feet measured along pipe for compacted trench zone backfill material. Length of auger pits to be measured to arrive at 40 linear feet.

2. A minimum of three density tests for each full shift of Work.

3. Density tests will be distributed among placement areas. Placement areas are: foundation, bedding, haunching, initial backfill and trench zone.

4. The number of tests will be increased if inspection determines that soil type or moisture content are not uniform or if compacting effort is variable and not considered sufficient to attain uniform density, as specified.

5. Density tests may be performed at various depths below fill surface by pit excavation. Material in previously placed lifts may therefore be subject to acceptance/rejection.

6. Two verification tests will be performed adjacent to in-place tests showing density less than acceptance criteria. Placement will be rejected unless both verification tests show acceptable results.

7. Recompacted placement will be retested at same frequency as first test series, including verification tests.

8. Identify elevation of test with respect to natural ground or pavement.

F. Recondition, re-compact, and retest at CONTRACTOR's expense if tests indicate Work does not meet specified compaction requirements. For hardened soil cement with nonconforming density, core and test for compressive strength at CONTRACTOR's expense.

G. Acceptability of crushed rock compaction will be determined by inspection.

3.12 DISPOSAL OF EXCESS MATERIAL

Dispose of excess materials in accordance with requirements of Section 02100 – Waste Material Disposal.

- END OF SECTION –

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SECTION 02260

EXCAVATION SUPPORT AND PROTECTION SYSTEMS FOR STRUCTURES

PART 1 GENERAL

1.01 SCOPE

This Section governs the requirements for designing, furnishing and installing, maintaining and removing excavation support and protection systems for structures.

1.02 RELATED SECTIONS

SECTION 01330 – Submittals
SECTION 02160 – Trench Safety Systems

1.03 REFERENCED STANDARDS

Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes and standards refer to the most current issue available at the time of Bid.

(AISC) American Institute of Steel Construction, Inc. - Steel Construction Manual.
(ASCE) American Society of Civil Engineers - Guidelines of Engineering Practice for Braced and Tied Back Excavations.
(DOE) Department of Defense - Unified Facilities Criteria Manual (UFC 3-220-01N); Geotechnical Engineering Procedures for Foundation Design of Buildings and Structures.
(ICC) International Code Council - International Building Code (IBC).
(TxDOT) Texas Department of Transportation - Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges.
Texas Health and Safety Code - Title 9, Subtitle A, Chapter 756, Subchapter C.
(USS) United States Steel Corporation- Steel Sheet Piling Design Manual.
(OSHA) Occupational Safety and Health Administration

1.04 DEFINITIONS

A. General Engineering Design Practice: General engineering design practice in area of the Project, performed in accordance with recent engineering literature on subject of shoring and stability of excavations and all applicable Federal and State laws.

B. Shoring: A temporary structural system designed to support vertical faces or nearly vertical faces, of soil or rock for purposes of excavation. Shoring includes cantilevered sheet piling,

internally braced sheet piling, slurry walls, soldier piles and lagging and other similar shoring systems. Sloping of the soil is not shoring.

1.05 SYSTEM DESCRIPTION

A. Where general engineering design practice is specified, provide drawings and signed calculations and have design performed by civil or structural engineer registered in State of Texas.

1. Provide design calculations that clearly disclose assumptions made, criteria followed, and stress values used for the materials being used.

2. Furnish references acceptable to the Engineer substantiating appropriateness of design assumptions, criteria, and stress values.

B. Design Requirements:

1. General:

a. Design means for safe and stable excavations in accordance with general engineering design practice.

b. Design steel members in accordance with the building code as specified and the AISC Manual of Steel Design.

c. Design shoring involving materials other than steel in accordance with building code as specified.

d. Perform design in accordance with soil characteristics and design recommendations contained in a written geotechnical report issued and signed by a geotechnical engineer hired by the Contractor. Geotechnical engineer shall be registered in the State of Texas. If available, Owner will make previous geotechnical reports available for Contractors' geotechnical engineer's use. The Contractor shall:

(1) Make copy of geotechnical report available at project site for Engineer's review.

(2) Retain and pay for geotechnical engineer's services.

(3) Obtain report based on soil samples, field and laboratory tests, and borings performed for the geotechnical report for the design of stability of excavations by the geotechnical engineer hired by Contractor.

e. When electing to design with material stresses for temporary construction higher than allowable stresses prescribed in the Manual of Steel Construction and the building code as specified, increase in such stresses shall not exceed 10 percent of value of prescribed stresses.

f. Minimum safety factor used for design shall not be less than 1.5.

g. The calculated minimum depth of penetration of shoring below the bottom of the excavation shall be increased not less than 30 percent if the full value of passive pressure is used in the design.

h. The maximum height of cantilever shoring above the bottom of excavation shall not exceed 15-feet. Use braced shoring when the height of shoring above the bottom of excavation exceeds 15-feet.

i. The location of the point of fixity for shoring shall not be less than half the calculated minimum embedment depth below the bottom of the excavation.

j. Generally acceptable references for the design of shoring and excavations are as follows:

(1) DOE UFC Manual - Geotechnical Engineering Procedures for Foundation Design of Buildings and Structures.

(2) USS Steel Sheet Piling Design Manual.

(3) Guidelines of Engineering Practice for Braced and Tied Back Excavations published by American Society of Civil Engineers.

2. Soldier Piles and Lagging:

a. Provide lagging over the full face of the excavation. Joints between pieces of lagging shall be tight to prevent loss of soil.

b. Provide full face lagging all around penetrations through the lagging.

c. If the soldier piles are installed in predrilled holes, the predrilled holes shall be filled with control density backfill after the soldier piles are installed.

d. The effective width of driven soldier piles for passive soil resistance shall not exceed 2 times the width of the pile. The effective width of concrete encased soldier piles for passive soil resistance shall not exceed 2 times the width of the concrete encasement.

e. Fill voids behind lagging with gravel or other material acceptable to the Engineer.

f. Apply loads from tie back soil, rock, or deadman anchors concentrically to soldier piles or wales spanning between soldier piles. Eccentrically loaded section soldier piles or wales are not acceptable.

g. Design soldier piles for downward loads including vertical loads from tie back anchors.

3. Soil Anchors, Rock Anchors and Deadmen Anchors:

a. Design tie back anchors for a safety factor of not less than 2 times the calculated load from the shoring.

b. Proof load all production anchors to not less than 125 percent of the calculated load from the shoring. Lock off anchors at the calculated anchor load.

c. The length of soil anchors used to calculate resistance to load from the shoring, shall not include any length within the potential active pressure soil failure zone behind the face of shoring.

d. Design tie rods for anchors for 130 percent of the calculated load from the shoring.

e. Design tie rods for anchors for 150 percent of the calculated load from the shoring when tie rod couplers are used and for other conditions where stress concentrations can develop.

C. Performance Requirements:

1. General:

a. Support faces of excavations and protect structures and improvements in vicinity of excavations from damage and loss of function due to settlement or movement of soils, alterations in ground water level caused by such excavations and related operations.

b. Specified Provisions:

(1) Complement, but do not substitute or diminish, obligations of Contractor for the furnishing of a safe place of work pursuant to provisions of the Occupational Safety and Health Act of 1970 and its subsequent amendments and other Federal and State health and safety rules and regulations applicable for protection of the Work, structures and other improvements.

(2) Represent minimum requirement for:

(a) Number and types of means needed to maintain soil stability.

(b) Strength of such required means.

(c) Methods and frequency of maintenance and observation of means used for maintaining soil stability.

2. Provide safe and stable excavations by means of sheeting, shoring, bracing, sloping, and other means and procedures, such as draining and recharging groundwater and routing and disposing of surface runoff, required to maintain the stability of soils and rock.

3. Provide support for trench excavations for protection of workers from hazard of caving ground.

4. Provide Shoring:

a. Where, as result of excavation work and analysis performed pursuant to general engineering design practice, as defined in this Section:

b. Where indicated on the Construction Plans.

5. For safe and stable excavations, use appropriate design and procedures for construction and maintenance to minimize settlement of supported ground and to prevent damage to structures and other improvements, including:

a. Using stiff support systems.

b. Following appropriate construction sequence.

c. Preventing soil loss through or under support system:

Provide support system that is tight enough to prevent loss of soil and extend deep enough to prevent heave or flow of soils from supported soil mass into the excavation.

d. Providing surface runoff routing and discharge away from excavations.

e. Where dewatering is necessary, recharge groundwater as necessary to prevent settlement in area surrounding excavation.

f. Where sheet piling is used, use interlocking type sheets. The sheet piles shall be continuous and driven in interlock. If the bottom of the excavation is located below the water table, use "thumb and finger" type interlock.

g. Not applying shoring loads to existing structures and other improvements.

h. Not changing existing soil loading on existing structures and other improvements.

i. Provide welded steel packing between soil retaining members such as sheet piles and wales and similar members when the gap exceeds 1/4-inch before the wales are loaded.

1.06 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of Section 01330- Submittals.

B. Shop Drawings and Calculations:

1. For trench excavations see Section 02160 - Trench Safety Systems for submittal requirements.

2. Submit, in advance of excavation work, design calculations as performed pursuant to general engineering design practice, as specified in this Section, and detail drawing showing means for safe and stable excavations. In design calculations and detail drawing, cover, as a minimum:
   a. Excavations adjacent to structures and other improvements, and
   b. Excavations 5 feet or more in depth, or less than 5 feet in depth when there is potential for cave in, at other locations.

3. Submit the following:
   a. Provide calculations for the different load, support, and other conditions that occur during the sequence of installation of shoring, construction of facilities protected by the shoring, and sequence of removal of shoring.
   b. Provide sketches showing the condition at various stages of installation and removal of shoring.
   c. Show structures, pipelines, and other improvements located near the shoring, and the shoring on a plan.
   d. When utilities penetrate the shoring, submit an elevation of all sides of the shoring showing the locations of the penetrations. Submit details on ground support and sealing around utility penetrations.

C. Written geotechnical report on soil characteristics and design recommendations, as specified in this Section.

D. Control Points and Schedule of Measurements:

1. Submit location and details of control points and method and schedule of measurements in accordance with requirements of this Section.

2. Promptly upon constructing control points and making measurements at such control points, as specified in this Section, submit copy of field notes with such measurements. The field notes shall show the current measurement and the change in measurement from the first measurement taken.

E. Detailed Sequence of Installation and Removal of Shoring:

1. Consider effects of ground settlement in the sequence of installation and removal of shoring.

2. Provide sketches showing the conditions at various stages in the sequence of installation and removal of shoring.

F. Submit submittals for stability of excavations as a complete package and include all items required in this Section. Incomplete submittals will not be reviewed and will be returned for resubmittal as a complete package.

1.07 SEQUENCING AND SCHEDULING

A. Do not begin work on excavations and means for providing stability of excavation until submittals have been accepted by Engineer and until materials necessary for installation are on site.

B. Submit submittals a minimum of 30 days prior to the scheduled date to begin excavation work.

C. Do not begin construction of any shoring or excavation operations until:

1. Control points as specified in this Section and as indicated on the Construction Plans on existing structures and other improvements have been established and surveyed to document initial elevations and locations.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 INSTALLATION AND REMOVAL

A. Install means for providing safe and stable excavations as indicated in the submittals.

B. Except for concrete encased soldier piles, slurry walls, and similar shoring systems, remove shoring by completion of the Work. Select shoring system and method of removal, which will minimize soil that sticks to shoring from creating large voids and causing settlement. To prevent settlement caused by pulling shoring, fill voids with sand, pea gravel, or pressure injected grout. The methods used shall prevent settlement. Pressure preservative treated wood lagging may be left in place when acceptable to the Engineer.

3.02 MAINTENANCE

A. Where loss of soil occurs, plug gap in shoring and replace lost soil with fill material acceptable to Engineer.

B. Where measurements and observations indicate possibility of failure or excessive movement of excavation support, determined in accordance with general engineering design practice, take appropriate action immediately. Appropriate action may include, but not limited to: immediately stopping all work and moving all personnel to a safe location.

C. Contractor shall conduct, as a minimum, a daily inspection(s) of the excavation support and protection systems. A written report of these daily inspection(s) shall be maintained on site and made available to the Engineer upon request.

3.03 CONTROL POINTS

A. Establish control points on shoring and on structures and other improvements in vicinity of excavation for measurement of horizontal and vertical movement:

1. Set Control Points on Shoring Support System:

    a. Set points at distances not exceeding 25-feet at each support level.

    b. Support levels shall be elevation of tie backs, wales, bottom of excavation, and other types of supports.

2. Set control points in corners of existing structures and on curbs, manholes, and other improvements indicated on the Construction Plans.

B. Provide plumb bobs with horizontal targets indicating original position of plumb bobs in relation to shoring at control points located on shoring.

C. Perform horizontal and vertical survey and measurement of control points at least once every week.

- END OF SECTION -

SECTION 02316

EXCAVATION AND BACKFILL FOR STRUCTURES

PART 1 GENERAL

1.01 SCOPE

This Section governs the excavation, backfilling, and compaction of backfill for structures.

1.02 DEFINITIONS

A. Unsuitable Material: Unsuitable soil materials are the following:

1. Materials that are classified as ML, CL-ML, MH, PT, OH, and OL according to ASTM D 2487.

2. Materials that cannot be compacted to the required density due to either gradation, plasticity, or moisture content.

3. Materials that contain large clods, aggregates, stones greater than 4 inches in any dimension, debris, vegetation, waste or any other deleterious materials.

4. Materials that are contaminated with hydrocarbons or other chemical contaminants.

B. Suitable Material: Suitable soil materials are those meeting specification requirements. Unsuitable soils meeting specification requirements for suitable soils after treatment with lime or cement shall be considered suitable, unless otherwise indicated.

C. Select Material: Material as defined in Paragraph 2.02A.

D. Backfill: Select material meeting specified quality requirements, placed and compacted under controlled conditions around structures.

E. Foundation Base: For foundation base material, use cement stabilized sand or concrete seal slab. The foundation base provides a smooth, level working surface for the construction of the concrete foundation.

F. Foundation Subgrade: Foundation subgrade is the surface of the natural soil which has been excavated and prepared to support the foundation base where needed.

G. Ground Water Control Systems: Installations external to the excavation such as well points, eductors, or deep wells. Ground water control includes dewatering to lower the ground water, intercepting seepage which would otherwise emerge from the side or bottom of the

excavation, and depressurization to prevent failure or heaving of the excavation bottom. Refer to Section entitled, "CONTROL OF GROUND WATER AND SURFACE WATER."

H. Surface Water Control: Diversion and drainage of surface water runoff and rain water away from the excavation. Remove rain water and surface water which accidentally enters the excavation as a part of excavation drainage.

I. Excavation Drainage: Removal of surface and seepage water in the excavation by sump pumping and using French drains surrounding the foundation to intercept the water.

J. Over-Excavation and Backfill: Excavation of subgrade soils with unsatisfactory bearing capacity or composed of otherwise unsuitable materials below the foundation as shown on Construction Plans and backfilled with foundation backfill material.

K. Shoring System: A structure that supports the sides of an excavation to maintain stable soil conditions and prevent cave-ins.

1.03 SUBMITTALS

A. Submit a work plan for excavation and backfill for each structure with complete written description which identifies details of the proposed method of construction and the sequence of operations for construction relative to excavation, dewatering (if required), and backfill activities. The descriptions, with supporting illustrations, shall be sufficiently detailed to demonstrate to the Engineer that the procedures meet the requirements of the Specifications and Construction Plans.

B. Submit excavation safety system plan.

1. The excavation safety system plan shall be in accordance with applicable OSHA requirements for all excavations.

2. The excavation safety system plan shall be in accordance with the requirements of Federal Requirements, 29 CFR, Part 1926, Standards - Excavation, Occupational Safety and Health Administration (OSHA).

C. Submit a ground and surface water control plan in accordance with requirements in this Section entitled, "CONTROL OF GROUND WATER AND SURFACE WATER."

1.04 TESTS

Testing and analysis of backfill materials for soil classification and compaction during construction will be performed by an independent laboratory provided by the Owner.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Perform excavation with equipment suitable for achieving the requirements of this Specification.

B. Use equipment which will produce the degree of compaction specified. Backfill within 3 feet of walls shall be compacted with hand operated equipment. Do not use equipment weighing more than 10,000 pounds closer to walls than a horizontal distance equal to the depth of the fill at that time. Use hand operated power compaction equipment where use of heavier equipment is impractical or restricted due to weight limitations.

2.02 MATERIAL CLASSIFICATIONS

Select Backfill: Clayey gravel or sand or lean clay with a plasticity index between 7 and 20 or clayey soils treated with the required proportion of lime.

PART 3 EXECUTION

3.01 PREPARATION

A. Conduct an inspection to determine condition of existing structures and other permanent installations.

B. Perform work in accordance with OSHA standards.

C. Install and operate necessary dewatering and surface water control measures in accordance with requirements of Section entitled, “CONTROL OF GROUND WATER AND SURFACE WATER.”

3.02 PROTECTION

A. Protect trees, shrubs, lawns, existing structures, and other permanent objects within the project area.

B. Protect and support above-grade and below-grade utilities which are to remain.

C. Restore damaged permanent facilities to pre-construction conditions unless replacement or abandonment of facilities are indicated on the Construction Plans.

D. Prevent erosion of excavations and backfill. Do not allow water to pond in excavations.

E. Maintain excavation and backfill areas until start of subsequent work. Repair and re-compact slides, washouts, settlements, or areas with loss of density at no additional cost to the Owner.

3.03 EXCAVATION

A. Perform excavation work so that the underground structure can be installed to depths and alignments shown on Construction Plans. Use caution during excavation work to avoid disturbing surrounding ground and existing facilities and improvements. Keep excavation to the absolute minimum necessary. No additional payment will be made for excess excavation not authorized by Engineer.

B. Upon discovery of unknown utilities, badly deteriorated utilities not designated for removal, or concealed conditions, discontinue work at that location. Notify Engineer and obtain instructions before proceeding in such areas.

C. Immediately notify the agency or company owning any line which is damaged, broken or disturbed. Obtain approval from Engineer and agency for any repairs or relocations, either temporary or permanent.

D. Avoid settlement of surrounding soil due to equipment operations, excavation procedures, vibration, dewatering, or other construction methods.

E. Provide surface drainage during construction to protect work and to avoid nuisance to adjoining property. Where required, provide proper dewatering and piezometric pressure control during construction.

F. Conduct hauling operations so that trucks and other vehicles do not create a dirt nuisance in streets. Verify that truck beds are sufficiently tight and loaded in such a manner that objectionable materials will not spill onto streets. Promptly clear away any dirt, mud, or other materials that spill onto streets or are deposited onto streets by vehicle tires.

G. Maintain permanent benchmarks, monumentation, and other reference points. Unless otherwise directed, replace those which are damaged or destroyed by the Work.

H. Provide sheeting, shoring, and bracing where required to safely complete the Work, to prevent excavation from extending beyond limits indicated on Construction Plans, and to protect the Work and adjacent structures or improvements.

I. Prevent voids from forming outside of sheeting. Immediately fill voids with grout, concrete fill, cement stabilized sand, or other material approved by Engineer.

J. After completion of the structure, remove sheeting, shoring, and bracing unless shown on Construction Plans to remain in place or directed by Engineer in writing that such temporary structures may remain. Remove sheeting, shoring and bracing in such a manner as to

maintain safety during backfilling operations and to prevent damage to the Work and adjacent structures or improvements.

K. Immediately fill and compact voids left or caused by removal of sheeting with cement stabilized sand or material approved by Engineer.

3.04 HANDLING EXCAVATED MATERIALS

A. Classify excavated materials. Place material which is suitable for use as backfill in orderly piles at a sufficient distance from excavation to prevent slides or cave-ins.

B. Provide additional backfill material, if adequate quantities of suitable material are not available from excavation and trenching operations at the site.

3.05 DEWATERING

A. Provide ground water control per Section entitled, "CONTROL OF GROUND WATER AND SURFACE WATER."

B. Keep ground water surface elevation a minimum of 2 feet below the bottom of the foundation base.

C. Maintain ground water control as directed by Section entitled, "CONTROL OF GROUND WATER AND SURFACE WATER" and until the structure is sufficiently complete to provide the required weight to resist hydrostatic uplift with a minimum safety factor of 1.2.

3.06 FOUNDATION EXCAVATION

A. Notify Engineer at least 48 hours prior to planned completion of foundation excavations. Do not place the foundation base until the excavation is accepted by the Engineer.

B. Excavate to elevations shown on Construction Plans, as needed to provide space for the foundation base, forming a level undisturbed surface, free of mud or soft material. Remove pockets of soft or otherwise unstable soils and replace with foundation backfill material or a material as directed by the Engineer. Prior to placing material over it, re-compact the subgrade where indicated on the Construction Plans, scarifying as needed, to 95 percent of the maximum Standard Dry Density according to ASTM D 698. If the specified level of compaction cannot be achieved, moisture condition the subgrade and re-compact until 95 percent is achieved, over-excavate to provide a minimum layer of 24 inches of foundation backfill material, or other means acceptable to the Engineer.

C. Fill unauthorized excessive excavation with foundation backfill material or other material as directed by the Engineer.

D. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in a satisfactory, undisturbed condition. Keep excavations free of standing water and completely free of water during concrete placement.

E. Soils which become unsuitable due to inadequate dewatering or other causes, after initial excavation to the required subgrade, shall be removed and replaced with foundation backfill material, as directed by Engineer, at no additional cost to the Owner.

F. Place foundation base, where needed, over the subgrade on same day that excavation is completed to final grade. Where base of excavations are left open for longer periods, protect them with a seal slab or cement-stabilized sand.

3.07 FOUNDATION BASE

After the subgrade is properly prepared, including the placement of foundation backfill where needed, the foundation base shall be placed. The foundation base shall consist of a 12-inch layer of crushed stone aggregate or cement stabilized sand. Alternately, a seal slab with a minimum thickness of 4 inches may be placed. The foundation base shall extend a minimum of 12 inches beyond the edge of the structure foundation, unless shown otherwise on the Construction Plans.

3.08 BACKFILL

A. Complete backfill to surface of natural ground or to lines and grades shown on Construction Plans. Use existing material that qualifies as select material, unless indicated otherwise. Deposit backfill in uniform layers and compact each layer as specified.

B. Do not place backfill against concrete walls or similar structures until laboratory test breaks indicate that the concrete has reached a minimum of 85 percent of the specified compressive strength. Where walls are supported by slabs or intermediate walls, do not begin backfill operations until the slab or intermediate walls have been placed and concrete has attained sufficient strength.

C. Remove concrete forms before starting backfill and remove shoring and bracing as work progresses.

D. Maintain fill material at no less than 2 percent below nor more than 2 percent above optimum moisture content. Place fill material in uniform 8-inch maximum loose layers. Compaction of fill shall be to at least 95 percent of the maximum Standard Dry Density according to ASTM D 698 under paved areas. Compact to at least 90 percent around structures below unpaved areas.

E. Where backfill is placed against a sloped excavation surface, run compaction equipment across the boundary of the cut slope and backfill to form a compacted slope surface for placement of the next layer of backfill.

F. Place backfill using cement stabilized sand in accordance with Section entitled, “CEMENT STABILIZED SAND.”

3.09 FIELD QUALITY CONTROL

A. Tests will be performed initially on minimum of one different sample of each material type for plasticity characteristics, in accordance with ASTM D 4318, and for gradation characteristics, in accordance with Tex-101-E and Tex-110-E. Additional classification tests will be performed whenever there is a noticeable change in material gradation or plasticity.

B. In-place density tests of compacted subgrade and backfill will be performed according to ASTM D 1556, or ASTM D 2922 and ASTM D 3017, and at the following frequencies and conditions:

1. A minimum of one test for every 100 cubic yards of compacted backfill material.

2. A minimum of three density tests for each full work shift.

3. Density tests will be performed in all placement areas.

4. The number of tests will be increased if inspection determines that soil types or moisture contents are not uniform or if compacting effort is variable and not considered sufficient to attain uniform density.

C. At least one test for moisture-density relationships will be initially performed for each type of backfill material in accordance with ASTM D 698. Additional moisture-density relationship tests will be performed whenever there is a noticeable change in material gradation or plasticity.

D. If tests indicate work does not meet specified compaction requirements, recondition, re-compact, and retest at Contractor's expense.

3.10 DISPOSAL OF EXCESS MATERIAL

Dispose of excess materials in accordance with requirements of Section entitled, “WASTE MATERIAL DISPOSAL.”

- END OF SPECIFICATION –

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SECTION 02320

BACKFILL MATERIALS

PART 1 GENERAL

1.01 SCOPE

This Section governs the classification, handling, and quality control requirements of backfill materials designed for applications associated with foundations, embedment or trench zones.

1.02 RELATED SECTIONS

SECTION 01330 – Submittals
SECTION 01340 – Shop Drawings, Product Data and Samples
SECTION 01410 – Testing Laboratory Services
SECTION 02215 – Excavating, Trenching and Backfilling for Utilities
SECTION 02216 – Excavation and Backfill for Structures

1.03 REFERENCES

CONTRACTOR shall refer to the latest issuance of the standards listed below.

ASTM C33 – Standard Specification for Concrete Aggregate
ASTM C40 – Standard Test Method for Organic Impurities in Fine Aggregates for Concrete
ASTM C123 – Standard Test Method for Lightweight Particles in Aggregate
ASTM C131 – Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C142 – Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM D1140 – Standard Test Method for Amount of Materials in Soils Finer than No. 200 Sieve
ASTM D2487 – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D2488 – Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)
ASTM D4318 – Identification and Classification of Dispersive Soils by Pinhole Test
ASTM D4318 – Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
TxDOT Tex-110-E – Particle Size Analysis of Soils

1.04 DEFINITIONS

A. Unsuitable Material: Unsuitable soil materials are the following:

1. Materials that are classified as ML, CL-ML, MH, PT, OH, and OL according to ASTM D2487.

2. Materials that cannot be compacted to the required density due to either gradation, plasticity, or moisture content.

3. Materials that contain large clods, aggregates, and stones greater than 4 inches in any dimension; debris, vegetation, and waste; or any other deleterious materials.

4. Materials that are contaminated with hydrocarbons or other chemical contaminants.

B. Suitable Material: Suitable soil materials are the following:

1. Those meeting specification requirements.
2. Unsuitable soils meeting specification requirements for suitable soils after treatment with lime or cement.

C. Backfill Material: Classified soil material meeting specified quality requirements for the designated application as embedment or trench zone backfill.

D. Foundation Backfill Materials: Natural soil or manufactured aggregate meeting Class I requirements and geotextile filter fabrics as required, to control drainage and material separation. Foundation backfill material is placed and compacted as backfill where needed to provide stable support for the structure foundation base. Foundation backfill materials may include concrete fill and seal slabs.

E. Foundation Base: The foundation base provides a smooth, level working surface for the construction of the concrete foundation. Crushed stone aggregate with filter fabric as required, cement stabilized sand, or concrete seal slab.

F. Foundation Subgrade: Either suitable soil of the trench bottom, or material placed as backfill of over-excavation for removal and replacement of unsuitable or otherwise unstable soils.

G. Embedment Material: Soil material placed under controlled conditions within the embedment zone extending vertically upward from top of foundation to an elevation 12 inches above top of pipe, and including pipe bedding, haunching, and initial backfill.

H. Trench Zone Backfill: Classified soil material meeting specified quality requirements and placed under controlled conditions in the trench zone from top of embedment zone to base course in paved areas or to the surface grading material in unpaved areas.

I. Source: A source selected by the CONTRACTOR for supply of embedment or trench zone backfill material. A selected source may be the project excavation, imported material from off-site borrow pits or commercial borrow pits, or sand and aggregate production or from manufacturing plants.

1.05 SUBMITTALS

A. Submittals shall conform to the requirements of the Section 01330 - Submittals.

B. Submit a description of source, material classification and product description, production method, and application of backfill materials.

C. Submit test results for samples of off-site backfill materials to comply with Paragraph 2.03.

D. Before stockpiling materials, submit a copy of temporary easement or approval from landowner for stockpiling backfill material on private property.

E. For each delivery of material, provide a delivery ticket which includes source location.

1.06 QUALITY CONTROL

A. Sampling:

1. The ENGINEER may sample and test backfill at:

a. Sources including borrow pits, production plants and CONTRACTOR's designated off-site stockpiles.

b. On-site stockpiles.

c. Materials placed in the Work.

2. The ENGINEER may resample material at any stage of work or location if changes in characteristics are apparent.

B. Production Verification Testing: The OWNER's testing laboratory will provide verification testing on backfill materials, as directed by the ENGINEER. Samples may be taken at the source or at the production plant, as applicable.

1.07 TESTS

A. Perform tests of sources for backfill material in accordance with Paragraph 2.03.B.

B. Verification tests of backfill materials may be performed by the OWNER in accordance with the Section 01410 - Testing Laboratory Service and in accordance with Paragraphs 1.06 and 2.03.

C. Random fill obtained from the Project excavation as source is exempt from prequalification requirements by CONTRACTOR but must be inspected by OWNER testing lab for unacceptable materials based on ASTM D2488.

PART 2 PRODUCTS

2.01 MATERIAL CLASSIFICATIONS

A. Materials for backfill shall be classified for the purpose of quality control in accordance with the Unified Soil Classification Symbols as defined in ASTM D2487. Material use and application is defined in utility installation specifications and Drawings either by class, as described in Paragraph 2.01.B, or by product descriptions, as given in Paragraph 2.02.

B. Class Designations Based on Laboratory Testing:

1. Class I: Well-graded gravels and sands, gravel-sand mixtures, crushed well-graded rock, little or no fines (GW, SW):

a. Plasticity Index: Non-plastic.

b. Gradation: D_{60}/D_{10} - greater than 4%; amount passing No. 200 sieve - less than or equal to 5%.

2. Class II: Poorly graded gravels and sands, silty gravels and sands, little to moderate fines (GM, GP, SP, SM):

a. Plasticity Index: Non-plastic to 4.

b. Gradations:

(1) Gradation (GP, SP): Amount passing No. 200 sieve - less than 5%.

(2) Gradation (GM, SM): Amount passing No. 200 sieve - between 12% and 50%.

(3) Borderline gradations with dual classifications (e.g., SP-SM): Amount passing No. 200 sieve - between 5% and 12%.

3. Class III: Clayey gravels and sands, poorly graded mixtures of gravel, sand, silt, and clay (GC, SC, and dual classifications, e.g., SP-SC):

a. Plasticity Index: Greater than 7.

b. Gradation: Amount passing No. 200 sieve - between 12% and 50%.

4. Class IVA: Lean clays (CL):

a. Plasticity Indexes:

(1) Plasticity Index: greater than 7, and above A line.

(2) Borderline plasticity with dual classifications (CL-ML), PI between 4 and 7.

b. Liquid limit: Less than 50.

c. Gradation: Amount passing No. 200 sieve - greater than 50%.

d. Inorganic.

5. Class IVB: Fat clays (CH):

a. Plasticity Index: Above A line.

b. Liquid Limit: 50 or greater.

c. Gradation: Amount passing No. 200 sieve - greater than 50%.

d. Inorganic.

6. Use soils with dual class designation according to ASTM D2487, and which are not defined above, according to the more restrictive class.

2.02 PRODUCT DESCRIPTIONS

A. Soils classified as silt (ML), elastic silt (MH), organic clay and organic silt (OL, OH), and organic matter (PT) are not acceptable as backfill materials. These soils may be used for site grading and restoration in unimproved areas as approved by the ENGINEER. Soils in Class IVB, fat clay (CH) may be used as backfill materials where allowed by the applicable backfill installation specification (refer to the Section 02216 - Excavation and Backfill for Structures, and Section 02215 - Excavating, Trenching and Backfilling for Utilities).

B. Provide backfill material that is free of stones greater than 6 inches, free of roots, waste, debris, trash, organic material, unstable material, non-soil matter, hydrocarbon or other contamination, conforming to the following limits for deleterious materials:

1. Clay Lumps: Less than 0.5% for Class I, and less than 2.0% for Class II, when tested in accordance with ASTM C142.

2. Lightweight Pieces: Less than 5% when tested in accordance with ASTM C123.

3. Organic Impurities: No color darker than standard color when tested in accordance with ASTM C40.

C. Manufactured materials, such as crushed concrete, may be substituted for natural soil or rock products where indicated in the product specification, and approved by the ENGINEER, provided that the physical property criteria are determined to be satisfactory by testing.

D. Bank Run Sand: Durable bank run sand classified as SP, SW, or SM by the Unified Soil Classification System (ASTM D2487) meeting the following requirements:

1. Less than 15% passing the number 200 sieve when tested in accordance with ASTM D1140. The amount of clay lumps or balls not exceeding 2%.

2. Material passing the number 40 sieve shall meet the following requirements when tested in accordance with ASTM D4318:

a. Liquid Limit: Not exceeding 25%.

b. Plasticity index: Not exceeding 7.

E. Concrete Sand: Natural sand, manufactured sand, or a combination of natural and manufactured sand conforming to the requirements of ASTM C33 and graded within the following limits when tested in accordance with ASTM C136:

Sieve	% Passing
3/8"	100
No. 4	95 to 100
No. 8	80 to 100
No. 16	50 to 85
No. 30	25 to 60
No. 50	10 to 30
No. 100	2 to 10

F. Gem Sand: Sand conforming to the requirements of ASTM C33 for course aggregates specified for number 8 size and graded within the following limits when tested in accordance with ASTM C136:

Sieve	% Passing
3/8"	95 to 100
No. 4	60 to 80
No. 8	15 to 40

G. Pea Gravel: Durable particles composed of small, smooth, rounded stones or pebbles and graded within the following limits when tested in accordance with ASTM C136:

Sieve	% Passing
1/2"	100
3/8"	85 to 100
No. 4	10 to 30
No. 8	0 to 10
No. 16	0 to 5

H. Crushed Aggregates: Crushed aggregates consist of durable particles obtained from an approved source and meeting the following requirements:

1. Materials of one product delivered for the same construction activity from a single source.

2. Non-plastic fines.

3. Los Angeles abrasion test wear not exceeding 45% when tested in accordance with ASTM C 131.
4. Crushed aggregate shall have a minimum of 90% of the particles retained on the No. 4 sieve with 2 or more crushed faces as determined by Test Method Tex-460-A, Part I.

5. Crushed Stone: Produced from oversize plant processed stone or gravel, sized by crushing to predominantly angular particles from a naturally occurring single source. Uncrushed gravel is not acceptable material for embedment where crushed stone is shown on the applicable utility embedment drawing details.

6. Crushed Concrete: Crushed concrete is an acceptable substitute for crushed stone as utility backfill. Gradation and quality control test requirements are the same as crushed stone. Provide crushed concrete produced from normal weight concrete of uniform quality; containing particles of aggregate and cement material, free from other substances such as asphalt, reinforcing steel fragments, soil, waste gypsum (calcium sulfate), or debris.

7. Gradations, as determined in accordance with Tex-110-E.

Sieve	Percent Passing by Weight for Pipe Embedment by Ranges of Nominal Pipes Sizes		
	>15"	**15" - 8"**	**<8"**
1"	95 – 100	100	-
3/4"	60 - 90	90 - 100	100
1/2"	25 - 60	-	90 - 100
3/8"	-	20 - 55	40 - 0
No. 4	0 - 5	0 - 10	0 - 15
No. 8	-	0 - 5	0 - 5

I. Select Backfill: Class III clayey gravel or sand or Class IV lean clay with a plasticity index between 7 and 20.

J. Random Backfill: Any suitable soil or mixture of soils within Classes I, II, III and IV; or fat clay (CH) where allowed by the applicable backfill installation specification (refer to the Section 02216 - Excavation and Backfill for Structures, and Section 02215 - Excavating, Trenching and Backfilling for Utilities).

K. Cement Stabilized Sand: Conform to requirements of the Section 02321 - Cement Stabilized Sand.

2.03 MATERIAL TESTING

A. Ensure that material selected, produced and delivered to the Project meets applicable specifications and is of sufficient uniform properties to allow practical construction and quality control.

B. Source or Supplier Qualification: Perform testing, or obtain representative tests by suppliers, for selection of material sources and products. Provide test results for a minimum of three samples for each source and material type. Tests samples of processed materials from current production representing material to be delivered. Tests shall verify that the materials meet specification requirements. Repeat qualification test procedures each time the source characteristic changes or there is a planned change in source location or supplier. Qualification tests shall include, as applicable:

1. Gradation: Complete sieve analyses shall be reported regardless of the specified control sieves. The range of sieves shall be from the largest particle through the No. 200 sieve (ASTM D1140).

2. Plasticity of material passing the No. 40 sieve.

3. Liquid limit, plastic limit, plasticity index (ASTM D 4318).

4. Pinhole test (ASTM D 4647, Method A).

5. Classification shall be reported in accordance with ASTM D 2487 and include (as a minimum):

   a. Group name

   b. Group symbol

   c. Soil color(s)

6. Los Angeles abrasion wear of material retained on the No. 4 sieve.

7. Clay lumps.

8. Lightweight pieces.

9. Organic impurities.

C. Production Testing: Provide reports to the ENGINEER from an independent testing laboratory that backfill materials to be placed in the Work meet applicable specification requirements.

D. Assist the ENGINEER in obtaining material samples for verification testing at the source or at the production plant.

PART 3 EXECUTION

3.01 SOURCES

A. Use of material encountered in the trench excavations is acceptable, provided applicable specification requirements are satisfied. If excavation material is not acceptable, provide from other approved source.

B. Identify off-site sources for backfill materials at least 14 days ahead of intended use so that the ENGINEER may obtain samples for verification testing.

C. Obtain approval for each material source by the ENGINEER before delivery is started. If sources previously approved do not produce uniform and satisfactory products, furnish materials from other approved sources. Materials may be subjected to inspection or

additional verification testing after delivery. Materials which do not meet the requirements of the specifications will be rejected. Do not use material which, after approval, has become unsuitable for use due to segregation, mixing with other materials, or by contamination. Once a material is approved by the ENGINEER, expense for sampling and testing required to change to a different material will be credited to the OWNER through a change order.

D. Bank run sand, select backfill, and random backfill, if available in the Project excavation, may be obtained by selective excavation and acceptance testing. Obtain additional quantities of these materials and other materials required to complete the Work from off-site sources.

E. The OWNER does not represent or guarantee that any soil found in the excavation work will be suitable and acceptable as backfill material.

3.02 MATERIAL HANDLING

A. When backfill material is obtained from either a commercial or non-commercial borrow pit, open the pit to expose the vertical faces of the various strata for identification and selection of approved material to be used. Excavate the selected material by vertical cuts extending through the exposed strata to achieve uniformity in the product.

B. Establish temporary stockpile locations for practical material handling and control, and verification testing by the ENGINEER in advance of final placement. Obtain approval from landowner for storage of backfill material on adjacent private property.

C. When stockpiling backfill material near the Project site, use appropriate covers to eliminate blowing of materials into adjacent areas and prevent runoff containing sediments from entering the drainage system.

D. Place stockpiles in layers to avoid segregation of processed materials. Load material by making successive vertical cuts through entire depth of stockpile.

- END OF SECTION -

SECTION 02840

PROTECTIVE BOLLARDS

PART 1 GENERAL

1.01 SCOPE

This Section governs the requirements for materials and construction for Protective Bollards.

1.02 RELATED SECTIONS

SECTION 01330 – Submittals
SECTION 01340 – Shop Drawings, Product Data and Samples

PART 2 PRODUCTS

A. Pipe shall be 8-inch diameter schedule 40 steel pipe, a minimum of 7 feet long. Galvanized pipe shall not be acceptable.

B. Concrete shall have a minimum strength of 3,000 psi at 28 days.

PART 3 EXECUTION

3.01 EXCAVATION

CONTRACTOR shall excavate a minimum 24-inch diameter hole, a minimum of 4 feet deep. Center pipe in hole at 1 foot above bottom of excavation.

3.02 YARD INSTALLATION

The hole shall be filled with concrete up to finished grade ensuring that the pipe is embedded in the concrete a depth of 3 feet along the sides and 1 foot beneath. The bollard shall extend 4 feet above proposed finished grade.

3.03 SLAB INSTALLATION

Where paving is involved, the hole shall be filled with concrete up to the proposed bottom of foundation or slab. Final placement of paving or slab will ensure that the pipe is embedded in the concrete a depth of 3 feet along the sides and 1 foot beneath. The bollard shall extend 4 feet above proposed finished slab elevation.

3.04 FILL AND CROWN

Fill the bollard with concrete after the concrete in the hole has set and crown top with a dome for water runoff.

3.05 PAINT

When all the concrete has set, the CONTRACTOR shall paint the exterior of the bollard(s) safety yellow and place black striped tape as indicated on the drawing detail.

- END OF SECTION -

Section 03400

Prestressed Concrete Poles

PART 1. GENERAL

1.01 SUMMARY

A. This specification is confidentially issued for this specific project only

B. Contractor shall be responsible for reading all specifications from all disciplines prior to bid

C. This specification is to establish design and quality standards for static cast concrete poles for power distribution, lighting, and security mounting equipment

D. All pole design structural calculations shall be prepared by a licensed engineer experienced in prestressed concrete design and wind loading calculations

1.02 PRICE AND PAYMENT PROCEDURES

A. Items inclusive of the requirements of this section are to be included in the bid price. Item may be part of general electrical work or standalone bid item. This item will be paid on a fixed price basis for all related equipment as shown on contract drawings, located within the project limits of construction, and specified herein. Fixed price shall include poles, foundation, grounding, light fixtures, electronic enclosures, and all other accessories as shown in the contract documents

1.03 REFERENCES

A. Refer to other technical specifications for this project including:

1. 16050 – Basic Electric Materials and Methods
2. 16051 – Basic Electrical Submittal and O&M Requirements
3. 16060 – Grounding and Bonding
4. 16211 – Electrical Utility Service

B. Not all references may be shown. Refer to other technical specifications in section 1.03 (A)

C. Relevant references may include all shown below:

1. National Electrical Code (NEC)
2. Underwriters Laboratories (UL)
3. National Fire Protection Association (NFPA) 70E – “Standards for safety in the workplace”
4. American National Standard Institute (ANSI)
5. Institute of Electrical and Electronic Engineers (IEEE)
6. ACI-318 – Building Code Requirements for Structural Concrete

7. ASCE-7 – Minimum Design Loads for Buildings and Other Structures
8. 2018 – International Building Code (IBC)
9. PCI Design Handbook – Precast/Prestressed Concrete Institute
10. Prestressed Concrete Institute – Guide for Design of Prestressed Concrete Poles
11. Concrete Reinforcing Institute – Manual of Standard Practice
12. American Society for Testing Materials (ASTM)
    a. C105 – Portland Cement
    b. C150 – Standard Specification for Type I and Type II Low Alkali Portland Cement
    c. C33 – Standard Specification for Concrete Aggregates
    d. C330 - Aggregates
    e. C494 - Admixtures
    f. A36 – Standard Specification for Carbon Structural Steel
    g. A82 – Cold Drawn Spiral Wire
    h. A416 – Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete (270K)
    i. A615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
    j. A706 – Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement

1.04 SUBMITTALS

A. Refer to referenced specifications for Basic Submittal and O&M Requirements

B. Concrete pole structural calculations, wind load calculations, and installation recommendations shall be prepared and sealed by licensed engineer as part of this work

C. Furnish detailed design drawing and computations for the pole supplied, including, but not limited to the following for review:

1. Calculated weight of each concrete pole
2. Center of gravity of each pole
3. Calculations of cracking and ultimate moment capacities at not more than 5-foot intervals
4. Dunnage and pickup points, including both one-point and two-point pickup locations
5. Detail of cross section and all points where reinforcing changes.
6. Section and strength properties including the ultimate
7. Cracking and zero tension moments and deflections at maximum 5-foot intervals along the pole.

8. Pole diameter at top, bottom, and ground line
9. Tip and butt wall thickness
10. Pre-stress strand; quantity, size, and dropout location
11. 28-day compressive strength of concrete
12. Diameter taper (inch/feet)
13. Installation depth and direct embedment recommendations
14. Wind loading calculations
15. Warranty certificates
16. Testing reports

PART 2. PRODUCTS

2.01 PRESTRESSED CONCRETE POLE

A. Standard class prestressed concrete poles suitable for direct embedment into the ground without special foundations shall be provided. Provide shall be one (1) piece construction and have access handholes in wall

B. Pole shall be provided with PVC conduit cast in pole to allow for installation of conductors and cables as specified in plan drawings

C. Wind loading strength: 150 mph and 1.3 gust factor for total support assembly, pole, supports, and attached appurtenances at indicated height above grade

D. Concrete pole structural calculations, wind load calculations, and installation recommendations shall be prepared and sealed

E. Poles shall be supported and protected during site storage, lifting and setting to prevent damage to the pole. Spalls or other damage incurred during these operations shall be repaired to restore the pole to “as new” condition

2.02 PHYSICAL CHARACTERISTICS

A. Shape and Length: Poles shall be square in cross-section, with chamfered corners, and shall have a standard taper of 0.162 inch per foot. Cross-sectional dimensions shall not deviate by more than 3/8 inch. The allowable tolerance for overall length shall be plus 3 inches and minus 2 inches. The width of the bottom face of the pole may be less than the top face

B. Finish: The pole shall have a smooth uncolored finish with no cracks. The top surface of each pole shall be troweled until all projections, depressions, and irregularities have been removed and the entire surface has a smooth texture and neat lines. Square corners and sharp edges shall be tooled to form smooth, chamfered corners. All small cavities shall be cleaned, saturated with water, and then filled with mortar. A small cavity is defined as one larger than ¼ inch but smaller than ¾ inch in diameter, and less than 3/8 inch deep. Larger non-structural cavities and spalls shall be repaired by opening the side of the damaged area on a 1 to 1 slope using a mechanical grinder, cleaning thoroughly and filling with a high

strength non-shrink concrete repair material. Poles with other defects may be repaired only upon authorization of, and using the method prescribed by the Design Engineer

C. Sealing Steel Strands: The end of each steel reinforcing strand (in the top and butt) shall be burned back to a minimum depth of ½ inch. The holes left by the removal of the strand shall be thoroughly cleaned of any loose residue. The holes shall then be filled with non-shrink grout and smoothed evenly with tip or butt surface

D. Cover: The prestressing strands shall have a minimum concrete cover of 1 inch, except that Type I poles will have a minimum cover of ¾ inch. The centerline axis along the faces of the poles shall be clear of embedded steel except for stirrups, spiral reinforcement and fabrication devices, so that ¾-inch diameter holes may be drilled without interference from the strands

E. Sweep: Sweep is the deviation of a pole from straightness. A straight line joining the edge of the pole at the butt and the edge of the pole at the top shall not be distant from the surface of the pole at any point by more than 3/8 inch for each 10 feet of length

F. Hole Drilling: Poles shall be drilled in accordance with approved drawings. The location of holes shall not deviate by more than 3/8 inch. Holes drilled after removal from molds shall be drilled from both sides of the pole and shall be uniform in entrance and exit. Holes drilled from opposing sides of the pole must be in the same plane and be centered on both faces

G. Cable Entrances: Two (2) cable entrances with couplings shall be cast in all 90 degrees to the handhole unless otherwise specified. Refer to plans for additional requirements

H. Handhole: Provide handhole with metal cover plate to act as junction box for conductor installations

2.03 STRENGTH REQUIREMENTS

A. Poles of each standard type, unless otherwise specified, shall be designed to withstand the rated design (cracking) and ultimate strength, with modifications to accommodate allowances for handling, transportation, and erection. The rated strength is that load which, if applied, in a direction perpendicular to the axis 2 feet below the pole tip and with the bottom of the pole (10 percent of its length plus 2 feet from the butt) held firm, will produce the first sign of hairline cracks. The ultimate strength is the load at which point failure occurs

B. All poles shall be capable of withstanding single point pickup from the horizontal position when lifting from a point 30 percent of the overall length down from the tip

2.04 MATERIALS

A. Chloride content: The chloride content of the concrete mix, including all ingredients, shall be 0.4 pounds per cubic yard, or less

B. Corrosion resistance: All inserts or attachments, if required, shall be of non-corrosive material or galvanized

C. Concrete: Concrete used in poles shall have a compressive strength at transfer of not less than 4,000 PSI, and a 28-day compressive strength of not less than 7,000 PSI, unless otherwise specified

PART 3. EXECUTION

3.01 QUALIFIED MANUFACTURERS

A. Lonestar Prestress Manufacturing Inc.

B. Or approved equal

3.02 INSTALLATION

A. Set units plumb, square, level, and secure according to manufacturer's written instructions and approved submittals

B. Poles shall be supported and protected during site storage, lifting and setting to prevent damage to pole. Spalls or other damage incurred during these operations shall be repaired to restore the pole to "as new" condition

3.03 HANDLING AND INSTALLATION PROCEDURES

A. Handling instructions:

1. Prestressed concrete poles will withstand a considerable amount of bending but should not be shock loaded while under load
2. Prestressed concrete poles should never be handled or picked up by the tip
3. When shipping poles, the poles should be supported at a minimum of three points for poles up to and including 40-feet and four points for poles over 40-feet
4. Poles up to 50 feet in length may be unloaded using a one-point pickup at the balance point but should never be transported in this manner. A two-point pickup must be used to transport a pole at the job site

B. Contractor will be responsible for conducting his own geotechnical investigation during the construction phase to finalize the foundation design

C. Installation procedure:

1. Prior to installation of the pole, electrical wiring, luminaries, and equipment brackets can be installed while the pole is lying horizontally on the ground
2. Excavate the proper diameter and depth hole per foundation show on drawings. Install reinforcing steel as shown on drawings, and pour foundation as appropriate during pole setting activities
3. To install, choke the pole with one end of a nylon sling 25 percent to 30 percent of the pole length from the top (see "Handling Instructions" paragraph for location). Attach the other end of the sling to the lifting hook of the crane
4. Lift the pole allowing the butt to rest on the ground until vertical

5. Lift the pole over foundation and lower until butt rests on foundation
6. While holding the pole, foundation pour around base of pole. Check for plumbness throughout the backfilling process
7. If the pole is equipped for an underground connection, stop backfilling to a point 6-inches below the connection. Make the connection and then finish backfilling the hole to a point 2-inches above grade.

3.04 DIRECT EMBEDMENT

A. Direct embedment is the most common and recommended method of installation of prestressed concrete poles. Soil conditions vary from location to location and should be investigated by an Engineer prior to designing the foundation. The "rule of thumb" for the depth of embedment is 10 percent of the overall length plus 2 feet. Depending upon the type of soil, an appropriate backfill should be selected. The chart below contains suggested guidelines for the selection of backfill:

1. Good Soil: Compacted well graded sand and gravel, hard clay or well graded fine and coarse sand. The excavated soil may be used as the backfill
2. Medium Soil: Compacted fine sand and clay, compact sandy loam, loose coarse sand and gravel. Requires select backfill. Clean, washed sand or minus ½ inch well graded gravel may be used
3. Poor Soil: Soft clay, clay loam, poorly compacted sand or clays containing large amounts of silt. Requires one of the following: cementitious earth, cement stabilized sand, limestone screenings or urethane foam

3.05 GROUNDING

A. Refer to grounding specification for additional requirements

B. A PVC conduit to pull ground wire through may be cast in pole if required

3.06 SITE QUALITY CONTROL

A. Inspect installed units for damage

B. Replace or repair damaged poles

C. Tests shall be made, and records shall be maintained, in accordance with the requirements of prestressed concrete institute MNL-116, "Manual for Quality Control for Plants and Production of Precast Prestressed Concrete Products"

END OF SECTION

Section 16004

Electrical Systems Testing and Startup

PART 1. GENERAL

1.01 SUMMARY

A. This specification is confidentially issued for this specific project only

B. Contractor shall be responsible for reading all specifications from all disciplines prior to bid

C. Requirements for electrical system testing and startup are included in this section.

1.02 REFERENCES

A. National Electrical Codes (NEC): NEC Article 110 - Requirements for Electrical Installations.

B. International Electrical Testing Association (NETA): “NETA Acceptance Testing Specifications.”

1.03 SUBMITTALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

B. The name, address, and telephone number of the proposed testing company to be engaged for testing the electrical system, together with their references and samples of recent test results and reports

C. The Contractor shall submit for approval a complete list, including catalog data and descriptive matter, of all products and equipment the Contractor proposes to furnish, and details as may be required by the Engineer to review proposed testing methods. At a minimum, the following are required.

1. Samples of proposed test report forms for the various types of tests indicated herein prior to commencement of field testing.
2. Test reports shall include but not be limited to the following: date, testing personnel names, temperature and humidity, description of item tested, type of tests performed, equipment used for testing, and test results.

PART 2. PRODUCTS

2.01 MATERIALS, EQUIPMENT, AND PERSONNEL

A. The Contractor shall provide the following:

1. Qualified personnel to conduct all testing.
2. Labor, temporary power, lighting, wiring, and materials required for testing.

3. Submit nameplates and label legends as required in Section 16075 - Electrical Identification. All abbreviations and titles shall be checked for clarity.

B. Test Equipment: The third party testing agency shall furnish all test equipment, which shall include but not be limited to the following:

1. Wet and dry bulb thermometer.
2. Meggers by James G. Biddle Co., or Associated Research, Inc., or approved substitution, suitable for 120, 208, 240, and 480 volt and systems testing. Use instruments rated at voltages recommended by Material and Equipment Manufacturers.
3. Portable radios.
4. A Simpson Model 260 Volt-Ohm-Millimeter, or approved substitution.
5. A phase sequence and rotation meters rated at 600 volts, 30-60 hertz, by Knopp, Inc., or approved substitution for the 120, 208, 240, and 480-volt systems.
6. A commercial model, three point, ground test by James G. Biddle Co., a "Vibroground" tester by Associated Research, Inc., or approved substitution.

C. The Contractor shall furnish and use safety devices such as rubber gloves and blankets, protective screens and barriers, danger signs, etc., to adequately protect and warn all personnel in the vicinity of the tests.

D. Test equipment, material, and labor for electrical system testing execution. Test shall be by the outside testing agency engaged for this purpose.

PART 3. EXECUTION

3.01 GENERAL

A. All testing to be performed in compliance with NETA Acceptance Testing Specifications. All submitted test results must include statement indicating compliance.

B. Prior to start of field testing the installation shall be completed, punch listed and inspected by the Engineer and/or Owner’s Representative for satisfactory completion of work.

C. Testing may be witnessed by the Engineer or Owner’s Representative. Provide 1 week advanced notice accordingly.

D. Where hard copy reports are generated, provide all original reports bound in a three (3) ring binder and assembled in a professional format. All reports shall be submitted to Engineer for review. Upon approval, any hard copies shall be left on site or turned over to Owner’s Representative.

3.02 TESTING

A. Molded Case Breaker Tests: The tests shall include the following:

1. Check adjustable magnetic trip settings against nominal values.

2. Megger each pole for freedom from grounds.
3. Check connections and tighten as required.

B. Inspection of Disconnect Switches:

1. Inspect contacts, clean as required.
2. Inspect arc chutes.
3. Inspect fuses for proper rating, type, and size.

C. 600-Volt Wire and Cable Tests:

1. 600-volt wire shall be meggered with a 500-volt megger for one minute, and values must be approximately as listed as follows:

Conductor Capacity	Resistance
Amperes	Ohms
0 - 24	1,000,000
25 - 50	250,000
51 - 100	100,000
101 - 200	50,000
201 - 400	25,000
501 - 800	12,000
Over - 800	5,000

2. The above values shall be determined with switchboards, panel boards, fuse holders, switches, and over current devices in place. Devices containing semi-conductors, such as diodes, transistors, and other devices, which can be damaged by the megger shall not be connected during meggering. Motors and transformers shall not be connected during meggering. Wire and cable shall be meggered after installation, not on the reel.
3. Wiring to be meggered shall be limited to feeder wiring between main distribution equipment and power panels, branch circuit panels, motor control centers, individual pieces of mechanical equipment and other similar equipment. Wiring for mechanical equipment connected to branch circuit panels shall also be meggered. Branch circuit wiring for lighting and receptacles shall not be meggered.
4. The Contractor shall perform all phasing tests and shall make changes necessary to assure proper rotation of all motors, the correct phasing and phase sequence of all circuits susceptible of being paralleled, the proper polarity on all instrument transformer wiring, and such other phasing tests and changes as may be required for the equipment being connected under this Contract.

D. Panelboards:

1. Test breaker ON/OFF operation.
2. Test voltages between phase and phase to ground at:
   a. Before incoming breaker.

b. After the incoming breaker at the bus.

c. At all feeder breaking.

3. Record all test results.

E. Miscellaneous Equipment Tests: Test all miscellaneous equipment for proper operation in accordance with equipment manufacturer's instructions.

3.03 SYSTEM STARTUP

A. Testing and Startup:

1. All elements of each electrical control system shall be confirmed to demonstrate that the total system satisfies all of the requirements of this Specification. The Contractor shall coordinate and schedule all of his testing and startup work with the Owner and Systems Integration Engineer.

2. Factory Tests: The electrical controls and all other associated hardware shall be tested via a full simulation at the factory, prior to shipment, to demonstrate that each component is operational and meets the requirements of these specifications. Manufacturer shall provide test routine program for shop testing of I/O wiring. Test results shall be certified, with written documentation provided to the Engineer upon test completion. Factory testing may be witnessed by the Engineer.

3. Field Tests: All electrical control system components shall be checked to verify that they have been installed properly and that all terminations have been made correctly. Witnessed field tests shall be performed on the complete system. Contractor shall provide a checklist for all electrical, control and instrumentation functions and send to Engineer for approval. Each function shall be demonstrated to the satisfaction of the Owner and Engineer on a item-by-item basis. Each test shall be witnessed and signed off by the Contractor and the Engineer upon satisfactory completion. The Contractor shall notify the Owner at least 2 weeks prior to the commencement date of the field tests. After tests are completed and with system fully operational, system shall run continuously for a period of 10 days without failure. Any failures shall be repaired and 10 day test shall start over again.

4. Start-up Testing will require a minimum of 10 working days after work is substantially complete, including loading of programs to local PLC. Provide 4 weeks' notice for program downloading by Programmer. This shall be accounted for in project schedule.

5. Prior to testing system, any PLC programs or HMI programs provided by other than the Systems Integration Engineer shall be furnished on CD for review by Engineer. Provide any special software necessary to run and test complete program.

END OF SECTION

Section 16020

Electrical Selective Demolition

PART 1. GENERAL

1.01 SUMMARY

A. This specification is confidentially issued for this specific project only

B. Contractor shall be responsible for reading all specifications from all disciplines prior to bid

C. This section covers selective demolition of electrical equipment.

1.02 REFERENCES

A. Temporary wiring of systems to maintain operation of facilities while undergoing modifications and demolition shall be provided in accordance with:

1. American National Standards Institute/National Fire Protection Association (ANSI/NFPA), No. 70 - National Electrical Code (NEC), Article No. 590 - Temporary Installations.

1.03 SUBMITTALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

B. Submit all products covered under this section for Engineer's approval.

C. Annotate existing drawings to sequence the demolition of systems, equipment removal, and temporary hook-ups.

D. Schedule with Owner for required shutdowns to accommodate system demolition and installation of temporary facilities.

E. With each submittal, include a copy of the applicable specification(s) page(s) for the item submitted and mark "Complies" or "Non-Compliance" or "Exception" adjacent to the applicable paragraph. Identify applicable drawing sheet number and specification section on front of each submittal cover.

1.04 QUALITY ASSURANCE

A. Verify field measurements and circuiting arrangements are as shown on Drawings.

B. Verify that abandoned wiring and equipment serve only abandoned facilities.

C. Demolition drawings are based on casual field observation and existing record documents. Report any discrepancies to Engineer before disturbing existing installation.

D. By beginning demolition, installer accepts existing conditions and warrants that he will maintain service to equipment and items not scheduled or indicated for removal, and that he will return to the Owner all serviceable items and systems in good operating conditions.

E. Before starting demolition, test installation and verify operating condition of all equipment that is to remain serviceable. Notify Owner in writing of any equipment that is not operable.

PART 2. PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual Sections, or as required to complete work intended by plans and specification.

B. The temporary electrical wiring and facilities shall be designed and constructed in strict compliance with NEC - Article No. 590.

PART 3. EXECUTION

3.01 PREPERATION

A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal as shown on plans.

B. Coordinate utility service outages with Utility Company to provide continuous service to operating equipment.

C. Where required, 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 at least one week before partially or completely disabling system. Minimize outage duration.

E. All existing equipment that is to remain serviceable shall be covered and sealed to prevent dust or water intrusion.

F. Where equipment, motor control centers, panels, and devices are to be removed or relocated and where wiring is to remain or be reused, trace out all wiring and tag conductors. Record data in “As-Built” drawings.

G. Where equipment is to be reused and is disabled without power for a period of over 1 week, the equipment shall be stored in a dry location and a heater shall be installed inside the enclosure and remain activated until equipment is placed back in service.

3.02 DEMOLITION

A. Demolish and extend existing electrical work as shown on plans, and as understood from observable conditions noted during the pre-bid site visit.

B. Remove, relocate, and extend existing installations to accommodate new construction. This includes rerouting of underground duct banks and conduits that

may not be documented on Owner's record drawings. Contractor is to allow for these conditions in bid price. Failure to do so is at Contractor's risk.

C. Remove abandoned wiring to source of supply.

D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, plug conduit, and patch surfaces.

E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

F. Disconnect and remove abandoned panelboards and distribution equipment.

G. Disconnect and remove electrical devices and equipment servicing utilization equipment that has been removed.

H. Repair adjacent construction and finishes damaged during demolition and extension work.

I. Maintain access to existing installations, which remain active. Modify installation or provide access panel as appropriate.

J. Extend existing installations using materials and methods as specified for new work.

K. Any existing equipment that is to remain serviceable and is damaged during demolition or during new work shall be repaired or replaced to Owner's satisfaction in working condition.

3.03 DISPOSAL AND SALVAGE

A. Salvage electrical and instrumentation equipment removed from existing facilities for reuse as shown on plans.

B. Material and equipment, which can be reused or salvaged, remains the property of the Owner unless specifically indicated in the Specifications or Drawings, or as designed by the Owner.

C. Materials and equipment which cannot be reused or salvaged for Owner's use will be removed and disposed by the Contractor at approved disposal facility.

D. Remove, seal, and store generators, motors, and other large equipment for Owner's use. Store at designated location wrapped in water and dust tight covering and on skids.

3.04 CLEANING

A. Clean and repair existing materials and equipment, which remains or is 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 arrangements.

END OF SECTION

Section 16050

Basic Electrical Materials and Methods

PART 1. GENERAL

1.01 SUMMARY

A. This specification is confidentially issued for this specific project only

B. Contractor shall be responsible for reading all specifications from all disciplines prior to bid

C. The electrical drawings and specifications under this section shall be made a part of the full contract documents. The drawings and technical specifications of this contract, supplemental information issued thereto, information to bidders and pertinent documents issued by the owner's representative are part of the overall construction documents. All constructions documents shall be complied with by general contractor

D. The requirements herein are base requirements for all specifications. Other specifications will refer to this section for detailed requirements. No one specification will have all details. Specifications shall be reviewed as a complete package. Coordinate as needed

E. All the above documents will be on file at the office of the owner's representative and shall be examined by all bidders prior to bid. Failure to examine all construction documents shall not relieve the responsibility of a fully functional system as described

F. The documents shall not be used as a basis for additional compensation due to omission of details of other sections, specifications, documents, and drawings

G. Furnish all work, labor, tools, staff, material, equipment, and operations necessary to provide and install a complete and functioning electrical system as defined in construction documents

H. The contractor shall be responsible for visiting the project site prior to bid submission to verify existing conditions for relevant modifications to final bid

I. It is the intent of the contract document that upon completion of the scope of work, the entire system shall be a finished/workable condition

J. Secure all permits, licenses, easements, and inspections as required by all authorities having jurisdiction. Give all notices and comply with laws, ordinances, rules, regulations, and contract requirements

K. Contractor shall determine the exact requirements for the utility service connections and metering facilities as set forth by the utilities that will serve the project. Contractor shall pay for and perform all work as required by those utilities. Refer to section 1.02 (A) for allowance requirements

L. This specification section is an inherent part of all work performed on this project and its contents shall apply for any and all electrical, controls, instrumentation, communication, and security related work

M. This specification covers all electrical equipment materials and methods required for a fully functional electrical system. This specification holds as a foundational document for electrical items stated in specifications under the same division

N. Relocations and adjustments up to 50 feet are required per this contract as requested by owner or engineer at no additional cost to owner. Include cost in bid

O. Contractor shall provide the equipment necessary for locating all underground pipes, conduits, and structures before digging. All locations of intersection shall be properly staked and identified. Locating all underground utilities is the sole responsibility of the contractor at no additional cost to owner

P. Where obstructions are present in existing spare underground conduits to be used in this project, use video camera to determine cause of obstruction. Coordinate with engineer

Q. Provide arc flash warning tags on all electrical equipment where required by NFPA 70E. Submit arc flash analysis for engineer's review

R. Major scope of work:

1. Provide grounding system per NEC Article 250, construction drawings, and technical specifications
2. Provide and install underground and above ground conduit/ductbank system as described in construction drawings and technical specifications
3. Provide and install emergency diesel generator and automatic transfer switch system

S. High level system requirements:

1. The electrical and control system shall include, but shall not be limited to, all circuit breakers, motor starters, alternator, contactors, indicating lights, selector switches, surge protector, phase failure, heaters, instruments, relays, programmable controllers, alarm light, push buttons, control transformers, electronic devices, sensors, interlock wiring, nameplates, and all other associated items required
2. Provide all heaters and equipment to motors per associated references and manufacturer's instructions

1.02 REFERENCES

A. Installations shall conform to all appropriate articles/sections of latest standards, codes, local codes, and ordinances of the owner, authority having jurisdiction, and all entities involved. Contractor shall be responsible for verifying relevance of each reference requirement per the project scope, appropriateness, owner input, and historical requirements. Contractor may submit questions on code requirements where legitimate conflict exists. Relevant references may include all shown below:

1. National Electrical Code (NEC)
2. Underwriters Laboratories (UL)
3. National Electrical Manufacturers Association (NEMA)

4. Insulated Power Cable Engineers Association (ICEA)
5. International Building Code (IBC)
6. National Fire Protection Association (NFPA) 70E – "Standards for safety in the workplace"
7. American National Standard Institute (ANSI)
8. Institute of Electrical and Electronic Engineers (IEEE)
9. International Energy Conservation Code (IECC)
10. Texas Center for Environmental Quality (TCEQ)

B. Where contract documents indicate requirements, which are in excess of minimum requirements stated in section 1.03 (A), the most stringent requirements shall be met. Should there be any conflicts between the contract documents and section 1.03 (A), submit RFI's prior to bid

C. Codes and ordinances having jurisdiction and specified codes shall serve as minimum requirements. Where the Contract Documents indicate requirements which are in excess of those minimum requirements then the requirements of the Contract Documents shall be followed. Should there be any conflicts between the Contract Documents and codes, or any ordinances, report these with bid

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination

1. Contractor is bound to coordinate all equipment and scope of work with engineers and sub-contractors under this contract. Coordination of various equipment installations and operations is required as not to delay scheduled installation and startup
2. Refer to contractor responsibilities section of this document for further coordination items

B. Preinstallation meetings

1. Should contractor require a pre-installation meeting for any equipment with engineer, contractor shall provide ample time to schedule all required parties

C. Scheduling

1. Provide schedule of construction to engineer for review on a monthly basis. Refer to submittal section for further requirements

D. Change orders

1. Change orders and RFI's shall be submitted with full technical explanation of request and shall contain statement confirming contractor has reviewed all construction documents
2. Confirm all work has been coordinated with all other trades prior to submitting change order

1.04 SUBMITTALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

1.05 RECORD DRAWINGS

A. At the start and during the progress of the job, keep one separate set of blue-line prints for making construction notes and mark-ups

B. Show conduit routing and wiring runs as constructed and identify each

C. Record all deviations from the contract documents

D. Submit set of marked-up drawings for review

1.06 QUALITY ASSURANCE

A. All manufacturers named are a basis of design for standard and quality expected. Substitutions of any equal product will be considered for acceptance. The judgement of equality of product substitution shall be made by the engineer and owner

B. UL Compliance: Materials manufactured within scope of Underwriters Laboratories shall conform to UL standards and have an applied UL listed mark

C. Materials and equipment shall be new, free from defects. Any and all equipment deemed defective by engineer shall be replaced at no additional cost to owner

D. All materials and equipment, of the same class, shall be supplied by the same manufacturer unless specified otherwise in construction documents

E. Contractor shall consider all degrees of uncertainty for all existing, hidden or unknown conditions. Bid shall cover all reasonable unknown conditions not evident in pre-bid site visit for additions and modifications to existing facilities

F. Any change orders or additional work beyond the scope of this project as bid shall be approved by engineer. Any unapproved work performed is at contractors' risk

G. Installation shall conform to engineering drawings and described in specifications. Any variation shall be pre-approved in writing by engineer before work begins. Any unauthorized work may be requested for removal at contractors' expense with no delay to construction schedule and at no additional cost to owner

H. Prior to bidding and during construction, contractor shall coordinate with equipment vendors/suppliers and determine requirements for power, control, and interconnection wiring. Provide conduits and conductors accordingly for complete operating system

1.07 PROJECT SAFETY:

A. Electrical system for this project has lethal voltages present. Contractor shall have qualified personnel perform installations by, or under direct on-site supervision of, a licensed master electrician

B. Contractor shall not work on energized equipment except when necessary and with all appropriate protective clothing, tools, and qualified staff required to perform tasks

C. Submit “Job Safety Plan & Electrical Work Permit” per NFPA 70E to engineer

D. Do not install fuel tanks within 50-feet of habitable building where prohibited by local codes. Field verify site with construction documents and notify engineer of any conflicts. Failure to do so is at contractors

1.08 CONTRACTOR QUALIFICATIONS

A. All prequalification’s under this contract shall be submitted prior to bid date

B. All electrical work shall be performed by a Texas State Licensed Electrical Contractor

C. Contractor and their subcontractors shall be experienced with electrical systems covered under this contract

D. Contractor firm, project supervisors, and electrical labor workers without recent experience in similar projects shall not be utilized to perform work under this contract. Projects older than 5-years are not considered recent

E. Electrical contractors, electricians, inspectors, installers, and programmers assigned to this project shall be full-time qualified employees

F. Contract employees shall not be utilized unless approved by engineer

G. Contractor shall be required to furnish proof of experience and employment where requested by owner, engineer, or their representatives

H. Maintain safety training program throughout project timeline. Program may be requested for review by owner, engineer, or their representatives

I. Pre-qualified electrical contractors are shown below:

1. Alterman
2. Clarion Electrical, LLC
3. McDonald Electric
4. Principal Control Services (PCS)
5. Pfeiffer & Son, Ltd.
6. RESCO Electric
7. SECO
8. Texan Municipal & Industrial
9. W.W. Payton
10. Or as pre-approved in writing via email, not less than seven (7) days before bid date

1.09 CONTRACTOR RESPONSIBILITIES

A. Contractor is bound to coordinate all equipment and scope of work with engineers and sub consultants under this contract. Coordination of various equipment installations and operations is required as not to delay scheduled installation and startup

B. Any and all delegation of construction of sub-contractors shall be coordinated prior submittal review and meetings with owner, owners' representatives, and engineering team

C. Scope of work in each specification and discipline drawings are ultimately the sole responsibility of the general contractor under this contract

D. Contractor shall verify all product materials and drawings prior to bidding

E. Plans and diagrams are illustrative and may not contain all devices, wiring point-to-point diagrams, and controls required to perform the intended function in construction documents. Not all required equipment quantities required for a fully functional system may be documented in drawings or specifications. Location and alignments for equipment shown on plans may require adjustment. Contractor is responsible for providing all appurtenances required for each stand-alone system and overall project system

F. Vendor furnished systems shall be coordinated prior to submittal to meet all required expectations in construction documents. All additional fees for testing, commissioning, and warranties shall be included in bid for all equipment/installation

G. Contractor to provide full contact list of all sub-contractors and vendors under this contract to engineer upon notice to proceed. Contact information shall include: Person's name, title, direct telephone number, address, and email information

H. All correspondence, RFI's, and submittals concerning electrical, controls, and related work shall be from general contractor. General contractor shall provide statement on all correspondence, RFI's, and submittals stating contractor has verified information and validity of the correspondence in reference to full construction documents from all disciplines. Any documents received not having this statement may be rejected without review

I. Contractor shall reach out to engineer for coordination of construction methods, plans, and specifications should they deem beneficial

J. Coordinate and pay all electrical power, natural gas, hardline telephone, cellular telephone, or special purpose utility installation. Contractor shall coordinate with owner for account setup or transfer ownership at substantial completion, method of choice is contractor's responsibility

K. Maintain documentation and notify owner of all utility coordination and requirements for new/modified services

1.10 COORDINATION

A. Coordinate installation of lightning protection with installation of other building systems and components including:

1. Electrical wiring
2. Supporting structures
3. Building materials
4. Metal bodies requiring bonding to lightning protection components
5. Building finishes

B. Coordinate installation of air terminals attached to single-membrane roof system with roofing manufacturer and installer

1.11 EMERGENCY POWER

A. Where required by drawings, provide any and all provisions for continuous electrical service thru contractor furnished standby generator power. Contractor shall not utilize an existing standby generator on the facility unless given permission by owner and engineer. Include all provisions in bid

B. Where power outage is required, coordinate with owner and engineer. Outage length shall be coordinated and approved by owner and engineer. Where outage exceeds approved timeframe, contractor shall provide equipment as required to maintain electrical power

PART 2. PRODUCTS

2.01 GENERAL

A. Products shown are not intended to discriminate against a product of similar quality and purpose by another manufacturer

B. Provide coordination with manufacturer's representative for exact model, options, configurations, and services included in bid. Where construction documents do not match manufacturer's representative equipment list, contact engineer prior to ordering and installing

C. Substitution items may be acceptable where deemed so by engineer and or owner's representative

D. All equipment and materials shall be rated for harsh industrial environments.

E. Equipment ratings shown on construction documents are minimum requirements and contractor may be required to provider the next size greater

F. Door mounted rotating operating mechanisms for circuit breakers are not permitted

G. All equipment installed on this project shall incorporate the installation of all devices and features to protect their respective equipment from the influence of other equipment, voltage irregularities, phase irregularities, power surges, harmonics, and other disturbances that may prevent proper and safe operation

H. All equipment shall be NEMA rated, IEC components are prohibited

I. Where model numbers are shown on drawings or specifications, provide current most up to date available model

PART 3. EXECUTION

3.01 GENERAL

A. Where required by drawings, provide any and all provisions for continuous electrical service thru contractor furnished standby generator power. Contractor shall not utilize an existing standby generator on the facility unless given permission by owner and engineer. Include all provisions in bid

B. Where power outage is required, coordinate with owner and engineer. Outage length shall be coordinated and approved by owner and engineer. Where outage exceeds approved timeframe, contractor shall provide equipment as required to maintain electrical power

C. All construction and equipment fabrication shall be of highest quality and installed in a workmanlike manner

3.02 TESTING

A. All equipment shall put through a trial run-in test to ascertain the performance complies with the intent of the specifications. All-in tests shall be made in the presence of the Engineer and owner's representatives. Control system shall be setup, calibrated, and tested by manufacturer's technician.

B. Contractor shall startup entire system prior to engineer present inspections. All troubleshooting and issues shall be corrected prior to scheduling owner/engineer inspections

C. All special testing of materials and equipment shall be provided by the contractor

D. Contractor shall coordinate and schedule testing and startup work with the owner and engineer

E. Provide full documentation for factor test and field tests

F. Where facility is located more than 100 miles from the project site, supplier shall provide accommodations for overnight stay for engineering team

G. All cables shall have an insulation test performed using 1000-volt megger that has been calibrated within the last twelve months

H. Cables installed with an insulation reading less than 500 megohms shall be removed and new cable installed and retested at no additional cost to the owner.

I. Cables installed with an unacceptable insulation reading shall be removed and new cable installed and retested at no additional cost to the owner. Submit cable megger test report to owner's representative and engineer for review. Include test results in O&M's.

J. The grounding system shall be tested in the presence of the owner's representative using the fall of potential method and shall provide a grounding system resulting in an ohmic value of five (5) ohms or less at no additional cost to the owner. The contractor shall submit test report to owner's representative. Test equipment must be calibrated within the previous 12 months. Provide dated calibration results along with submittal.

K. All controls shall be fully tested prior to shipment and installation at project facility

L. Contractor shall fully inspect all controls, wiring devices, conduit, and other items before starting work, ordering materials, or submitting shop drawings for discrepancies to construction documents. Inform engineer of any discrepancies. Failure to do so may result in contractor's responsibility for any required changes at no additional cost to owner

3.03 TRAINING

A. Contractor shall provide two (2) 8-hour classes covering all equipment installed from a systematic level to general maintenance, operation, and troubleshooting. Provide all training manuals prior to start of class to operations, owner, and engineer for review

B. Engineer or owner may attend training where requested

C. Contractor shall provide adequate classroom environment or coordinate for on site facility to cover training

D. Training agenda and outline of training course shall be forwarded to engineer for review

E. Coordinate with any and all manufacturers required for adequate training

F. Document all attendees and acquire signatures upon completion of training program

G. Owner/Engineer shall sign a document provided by contractor indicating installation has formally been accepted

H. Inform engineer where training does not require two (2) full 8-hour classes

I. Schedule with owner minimum two (2) weeks in advance

3.04 INSTALLATION

A. All slabs around electrical equipment shall be constructed and sloped to avoid any standing water

B. Do not overfill raceways. Provide additional conduit where cables purchased exceed standard cable fill calculations

C. Provide minimum 48 inches of workspace in front of electrical equipment

D. Provide a minimum of 8 inches between wall or rack mounted enclosures/ equipment. Do not extend past building wall and maintain 6 inches from edge of wall

3.05 REPAIR/RESTORATION

A. Where any equipment performance does not conform to specifications or parameters are out of tolerance, per engineers or owner's opinion, contractor shall remove and replace equipment at no additional cost to owner

B. Where contractor damages existing facilities, damaged equipment shall be replaced with equal or better at no additional cost to owner. Contractor shall take photos of

facility prior to starting work to dispute any discrepancies. Where photos are not taken, damaged equipment shall be replaced at owner's request

C. Any damage to underground utilities is the responsibility of the contractor for repair and restoration

D. Where equipment fails or gets damaged, contractor shall replace with new. Repair is not permitted unless specifically approved by owner, owner's representative, or engineer

3.06 SYSTEM STARTUP

A. Upon successful testing, contractor shall provide full system startup in presence of authority, owner's representative, and engineer presenting fully functional gate operating system with all respective capabilities.

B. Contractor is responsible for coordinating with all parties required for system startup including manufacturer's prior to system startup. Ample time is required for coordination.

C. System will be not be accepted by owner until all systems are started and presented to authority, owner's representative, and engineer without issues or pending punch list items.

3.07 ADJUSTEMENT/CALIBRATION

A. Should initial testing or system startup not present an acceptable functioning system, adjustment/calibration shall be performed as necessary at no additional cost to owner.

B. All equipment shall put through a trial run-in test to ascertain the performance complies with the intent of the specifications. All-in tests shall be made in the presence of the Engineer and owner's representative.

3.08 CLEANING

A. Remove all temporary labels, dirt, paint, grease and stains from all exposed equipment. Upon completion of work, clean equipment and entire installation site in a workmanlike manner. No loose parts or scraps or equipment shall be left on the premises. Site shall not be accepted by owner where site is not suitably cleaned to engineer or owner's representative preference.

B. Equipment paint scars shall be repaired with paint kits supplied by the equipment manufacturer, or with an approved paint.

C. Clean interiors of each item of electrical equipment. At completion of work all equipment interiors shall be free from dust, dirt, and debris.

D. Concrete spoils shall not be dumped on site without approval by engineer or owner

3.09 CLOSEOUT

A. System acceptance upon substantial completion shall occur only when the below items have been submitted, accepted, and approved.

1. Submittals
2. O&M Manuals
3. Contractor testing
4. Inspections
5. Operations team training
6. Warranty certificates
7. Shop testing
8. Record drawings
9. Spare parts

3.10 MAINTENANCE/WARRANTY

A. Provide extended warranty certificates with contact information to operations and include in Operations & Maintenance manual.

B. Contractor shall provide full system wide warranty on all equipment for 3-year. Warranty shall include all labor and materials required to repair or replace equipment defective or malfunctioning at no additional cost to owner

C. Provide any and all testing equipment required to verify equipment malfunction (i.e. power monitor, etc.)

D. Warranty shall include, but not limited to; equipment, devices, hardware, and software

E. Warranty begins at time of written acceptance of substantial completion

F. Provide warranty certificates for electrical installation and consolidate warranty certificates from sub consultants with contact information for repairs

G. General contractor is ultimately responsible for all warranty items and requests

H. All repairs shall be made within 24 hours of receipt of required parts from manufacturer with minimum priority shipping. Any repairs not completed within five (5) working days from date of notice are subject to owner hiring separate integrator to perform services. Services shall be invoiced to general contractor

END OF SECTION

Section 16051

Basic Electrical Submittal and O&M Requirements

PART 1. GENERAL

1.01 SUMMARY

A. This specification is confidentially issued for this specific project only

B. Requirements described in this specification are in addition to any submittal requirements of other specifications

1.02 SUBMITTALS

A. Submit all submittals within sixty (60) days of notice to proceed.

B. Review of submittals shall not remove sole responsibility of contractor for furnishing materials or equipment of proper dimension, quantity, quality, or rating; nor will such review remove the responsibility for errors in the submittals.

C. Each submittal shall be submitted as a single pdf per specification with all related equipment.

D. Include catalog cuts, general descriptive information, catalog numbers, and manufactures name

E. Shop drawings shall include detailed drawings with dimensions, schedules, weights, capacities, installation details, and all pertinent information for a complete and fully functional equipment installation.

F. Failure to process submittals on any item(s) specified shall be at risk of contractor to replace any and all unreviewed items as directed by engineer, authority, or owner.

G. Contractor shall assume all costs and liabilities which may result ordering and installing any equipment/material prior to review of the submittals. No work shall be done prior to review of all submittals. In case of corrections required, rejection and resubmit required; resubmit submittals until owner’s representative and or engineer review updated submittals. This process shall not label as cause of any delays in construction.

H. Contractor shall have two (2) submittal reviews after which contract may be charged by owner and or engineer at firm hourly rates to review additional submittals. After final reviews, provide final copies in printed/PDF O&M Manuals.

I. Submittals shall be compiled from the manufacturer’s latest product data. Provide most update product where product specified has been replaced, recalled, discontinued, or newer product exists. Provide description on submittal stating reason for not providing product specified in construction documents.

J. Contractor shall clearly indicate on submittal which items and options are proposed. Submittal may be marked rejected-resubmit where if specific items and

options proposed are not clearly marked. Submittal may be rejected where transmittal cover page and required information in this section is not provided.

K. Where requested, furnish samples of materials for acceptance review. If a sample has been reviewed and accepted, equipment installed shall maintain equal quality to sample provided. Should engineer deem installed equipment does not match quality of sample provided, item shall be replaced at engineer's discretion at no additional cost to owner

L. Submittals shall be provided one section at a time. All related submittals are to be provided at one time

M. Hard copies are not required for submittal review. Where required by owner, or general conditions, hard copies of any and all documentation shall be under the contractor's responsibilities

N. Provide a schedule describing estimated start dates, completion dates, shop test dates, and field test dates. Contractor shall provide updated schedules to our office in a regular schedule upon any changes

O. Contractor shall provide submittal log showing status of submittal approved, rejected, and pending with each submittal

P. Contractor shall review all voltages, horsepower, current, phase, and starter size requirements for all equipment prior to providing submittals to engineer for review. Shop drawing review by engineer does not remove this responsibility. Incorrect submittal information shall be at risk of contractor and at no additional cost to owner

Q. Data sheets shall have model numbers that correctly identify equipment and accessories as described in construction documents highlighted or boxed

R. Submittals shall require a minimum of two (2) weeks for review from time of receipt by engineer. Contractor shall provide submittals with sufficient time for review as to no impede construction schedule. Lack of required coordination shall not be acceptable for construction schedule extension

S. All submittals for control panels, control sections of MCC, controllers, and vendor furnished panels shall contain statement of U.L. certification and identifying name and number of U.L. certification for fabrication shop. All submittals without this information shall be marked rejected. Any panels installed without U.L. listing, and where not acceptable by engineer or owner, shall be replaced at no additional cost to owner

T. Any and all equipment installed without approval not matching construction documents shall be replaced at no additional cost to owner

U. General contractor shall route all vendor submittals with electrical requirements to electrical contractor who shall review and coordinate all power and control items. Any variation to construction documents shall be noted accordingly on submittal

V. All resubmittals shall indicate modifications due to original submittal comments from engineer

W. Include all relevant technical specifications with each submittal. Mark each section as "comply", "non-compliant", and "substitution"

X. Provide transmittal cover page on all submittals with the following information:

1. General contractor company name
2. General contractor project manager name and contact information
3. Sub-contractor company name
4. Sub-contractor project manager name and contact information

1.03 ACCEPTANCE AND SUBSTITUTIONS

A. All manufacturers named are a basis as a standard of quality and substitutions of any equal product will be considered for acceptance. The judgment of equality of product substitution shall be made by the Engineer and owner's representative

B. Substitutions for equipment specified or shown on plans as "Or pre-approved equal" shall be submitted for approval prior to bid. Failure to submit RFI for pre-approval may lead to rejection of substitution for higher cost equipment originally specified in construction documents.

C. Substitutions after award of contract shall be made only within sixty (60) days after notice to proceed. Furnish all required supporting data. The submittal of substitutions for review shall not be cause for time delay of construction.

D. Where substitutions are offered, the substituted product shall meet the product performance as set forth in the specified manufacturer's current catalog literature, as well as meeting the details of the construction documents.

E. The details on the drawings and the requirements of the specifications are based on the first listed item of material or equipment; if any other than the first listed materials or equipment is furnished, then assume responsibility for the correct function, operation, and accommodation of the substituted item. In the event of misfits or changes in work required, either in this Section or other Sections of the Contract, or in both; bear all costs in connection with all changes arising out of the use of other than the first listed item specified

1.04 REQUIRED SUBMITTALS FOR REVIEW:

1. Wiring devices
2. Wire
3. Conduit and fittings
4. Generator
5. Automatic transfer switch
6. Enclosed circuit breakers
7. Mini-power zones
8. Surge protection devices
9. All relays & terminals
10. Grounding

11. Junction boxes and pull boxes
12. Panelboards and circuit breaker data
13. Fuses
14. Contactors
15. Transformers
16. Lighting fixtures and poles
17. Vendor furnished equipment
18. Project schedule on a monthly basis
19. Warranty certificates
20. Testing reports

1.05 OPERATIONS & MAINTENANCE MANUALS

A. Hardcopies provided to owner, once approved, are to be professionally assembled with tabs and coversheets

1. Wiring diagrams shall be on same size pages (8.5 x 11 or 11 x 17 pullout sheets) as used in O&M's and shall be placed in a separate section of the manuals identified "Wiring Diagrams"

a. Each O&M manual hard copy shall include USB jump drive containing complete and organized in PDF format inserted in pocket of binder

b. All O&M manuals shall be written in a professional manner and bound in high quality latching vinyl binder. Loose page three ring binders shall not be used for hard copy O&M manual

B. Provide diagrams of all control panels in clear plastic laminated pages. One (1) hard copy and one (1) copy in pocket affixed to inside of cabinet door

C. Six (6) weeks prior to the completion of the project, compile an operations and maintenance manual for each item of equipment. These manuals shall include detailed instructions and maintenance, warranty certificates, vendor contact information, and spare parts lists

D. O&M manuals shall be reviewed by engineer and owner's representative prior to printing and delivering hard copy to operations

E. In addition to record drawings, submittals, manufacturer's operational instructions, and maintenance instructions, O&M's shall include sufficient literature to detail operation, removal, installation, configuration, adjustment, calibration, and testing of equipment by operations

F. All related submittals are to be provided at one time as follows:

1. Contact information for all contractors and vendors
2. System hardware/installation
3. System software (where applicable)
4. Operation of equipment

5. Electrical and Control wiring diagrams
6. Maintenance and Troubleshooting
7. Warranty Certificates
8. Point-To-Point wiring diagrams for each circuit installed

G. O&M manuals should be complete and approved prior to any scheduled training

1.06 RECORD DRAWINGS

A. At the start and during the progress of the job, keep one separate set of blue line prints for making construction notes and mark-ups

B. Show conduit routing and wiring runs as constructed and identify each. Record all deviations from the Contract Documents

C. Submit set of marked up drawings for review

D. The Contractor is always required to keep up to date blue lines and may be reviewed during construction at any time by the Engineer. Record Drawings that are found to be inaccurate are the responsibility of the Contractor

E. Provide Record Drawing that clearly show any work that varies from the Contract Drawings. Remove any lines or text from drawings that no longer apply as a result of as installed variations. “Record Drawing” Drawings shall be on backgrounds that are furnished by the Engineer. Submit Record Drawing Drawings electronically for review

F. Show accurate dimensioned layout of conduits under or encased in building slabs

G. Show accurate dimensioned location of all conduits and ductbanks on site and on structures that are installed or modified under this contract. Identify conduits by tag number

H. Record Drawing construction drawings shall be provided on full size plan sheets for Owner and furnished electronically in AutoCAD format for Owner and Electrical Engineers files. Provide hard copy quantities specified in this specification or in General Conditions Specifications, whichever is more stringent

END OF SECTION

Section 16052

Electrical Identification

PART 1. GENERAL

1.01 SUMMARY

A. This specification is confidentially issued for this specific project only

B. Contractor shall be responsible for reading all specifications from all disciplines prior to bid

C. Identification of electrical materials, equipment, and installations

D. Nameplate identification on MCC's and control panels

E. Arc Flash Warning Signs

F. Equipment and High Voltage Warning Signs

G. Identification of conduit and conductors

1.02 REFERENCES

A. National Electrical Code: Components and installation shall comply with NFPA 70

B. Comply with ANSI C2

1.03 SUBMITTALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

1.04 RECORD DRAWINGS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

1.05 OPERATIONS & MAINTENANCE MANUALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

PART 2. PRODUCTS

2.01 RACEWAY AND CABLE LABELS

A. Label wiring with yellow heat shrink type markers with black machine printing. Labels shall be Raychem or Panduit

B. Buried conduit marking tape for marking path of buried conduits shall be a six (6") inch and red color nominal width strip of polyethylene with highly visible and foil backed, repetitive marking "BURIED CONDUIT", or similar language, along its length

C. Nameplates shall be micarta lamicoid material, 1/8” thick, black background with white 3/8 IN. block lettering engraving. Attachment means shall be made with a minimum of two aluminum rivets. All instruments shall have round shaped black phenolic tags with white 1/4 IN. block lettering, attach with 316 SS cable

D. Manufacturer’s Standard Products: Where more than one type is listed for specified application, selection is Installer’s option, but provide single type for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, or as specified elsewhere

E. Conform to ANSI A13.1, Table 3, for minimum size of letters for legend and minimum length of color field for each raceway or cable size

1. Color: Black legend on orange field
2. Legend: Indicates voltage

F. Pre-tensioned, Wraparound Plastic Sleeves: Flexible, preprinted, color coded, acrylic bands sized to suit diameter of line it identifies and arranged to stay in place by pre-tensioned gripping action when placed in position

1. Provide identification wire marker for all power and control conductors.

G. Colored Adhesive Tape: Self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 in. wide for phase and ground conductor identification

H. Underground Line Warning Tape: Permanent, bright colored, continuous printed, vinyl tape with following features:

1. Size: Not less than 6 in. wide by 4 mils thick.
2. Compounded for permanent direct burial service.
3. Embedded continuous metallic strip or core.
4. Printed Legend: Indicates type of underground line.

I. Tape Markers: Vinyl or vinyl cloth, self-adhesive, wraparound type with preprinted numbers and letters. Limited use for indoor control cabinets

J. Aluminum, Wraparound Marker Bands: Bands cut from 0.014 in. (0.4 mm) thick aluminum sheet, with stamped or embossed legend, and fitted with slots or ears for permanently securing around wire or cable jacket or around groups of conductors

K. Plasticized Card Stock Tags: Vinyl cloth with preprinted and field printed legends. Orange background, except as otherwise indicated, with eyelet for fastener

L. Aluminum Faced Card Stock Tags: Wear resistant, 18-point minimum card stock faced on both sides with embossable aluminum sheet, 0.002 in. (0.05 mm) thick, laminated with moisture resistant acrylic adhesive, and punched for fastener. Preprinted legends suit each application

M. Brass or Aluminum Tags: Metal tags with stamped legend, punched for fastener. Dimensions: 2 by 2 in. by 0.05 in. for conduit and power conductor identification. Attached with stainless steel bands

2.02 ENGRAVED NAMEPLATES AND SIGNS

A. Manufacturer's Standard Products: Where more than one type is listed for specified application, selection is Installer's option, but provide single type for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, or as specified elsewhere

B. Engraving stock, melamine plastic laminate, 1/16 in. (1.6 mm) minimum thick for signs up to 20 sq. in. (129 sq. cm), 1/8 in. (3.2 mm) thick for larger sizes.

1. Engraved Legend: Black letters on white face.
2. Punched for mechanical fasteners or stainless-steel screws.
3. Use in control panels, MCC's, device housings, boxes, and similar locations.

C. Baked Enamel Signs for Interior Use: Preprinted aluminum signs, punched for fasteners, with colors, legend, and size as indicated or as otherwise required for application. 1/4 in. (6.4 mm) grommets in corners for mounting

D. Exterior, Metal Backed, Butyrate Signs: Wear resistant, non-fading, preprinted, cellulose acetate butyrate signs with 0.0396 in. (1 mm), galvanized steel backing, with colors, legend, and size appropriate to application. 1/4 in. (6.4 mm) grommets in corners for mounting

E. Fasteners for Plastic Laminated and Metal Signs: Self-tapping stainless-steel screws or No. 10/32 stainless steel machine screws with nuts, flat washers and lock washers

F. Exterior, Painted Aluminum, Warning Signs: Wear resistant, non-fading, pre-printed aluminum with glossy finish with colors, and size appropriate to applications, ¼ inch grommets in corners for mounting. Provide per standards ANSI 2535 and OSHA 1910.145

2.03 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Cable Ties: Fungusinert, self-extinguishing, 1 piece, self-locking, Type 6/6 nylon cable ties with following features:

1. Minimum Width: 3/16 inch
2. Tensile Strength: 50-pound minimum.
3. Temperature Range: -40°F to 185°F
4. Color: As indicated where used for color coding

B. Paint: Alkyd-urethane enamel. Primer as recommended by enamel manufacturer

2.04 MCC AND CONTROL PANELS

A. Wire Markers: Provide wire markers on all power and wiring in MCC's and panels of all types. Identify wire at points of termination at devices and at terminal strips

B. Provide nameplates on body or housing of all pressure switches, transmitters, and other devices

C. Provide engraved nameplates near base of all relays and similar devices. Adhesive materials not allowed

PART 3. EXECUTION

3.01 INSTALLATION

A. Disconnecting Means/Circuit Breakers

1. All disconnecting means shall include the identification of the circuit source that supplies the disconnecting means and be legibly marked, with durable label, to indicate its purpose.

B. Install identification devices according to manufacturer's written instructions.

C. Install labels where indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment

D. Lettering, Colors, and Graphics: Coordinate names, abbreviations, colors, and or designations used for electrical identification with corresponding designations used in Contract Documents or required by codes and standards. Use consistent designations throughout Project

E. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work

F. Self-Adhesive Identification Products: Not allowed. Use stainless steel screws.

G. Identify feeders over 600 V with "DANGER HIGH VOLTAGE"; in black letters 2 in. (51 mm) high, stenciled with paint at 10 ft (3 m) intervals over continuous, painted orange background. Identify following:

1. Entire floor area directly above conduits running beneath and within 12 in. (305 mm) of basement or ground floor that is in contact with earth or is framed above un-excavated space
2. Wall surfaces directly external to conduits concealed within wall
3. All accessible surfaces of concrete envelope around conduits in vertical shafts, exposed in building, or concealed above suspended ceilings
4. Entire surface of exposed conduits

H. Install painted identification as follows:

1. Clean surfaces of dust, loose material, and oily films before painting
2. Prime Surfaces: For galvanized metal, use single component, acrylic vehicle coating formulated for galvanized surfaces. For concrete masonry units, use heavy duty, acrylic resin block filler. For concrete surfaces, use clear, alkali resistant, alkyd binder type sealer
3. Apply one intermediate and one finish coat of silicone alkyd enamel
4. Apply primer and finish materials according to manufacturer's instructions

I. Identify Raceways and Exposed Cables of Certain Systems with Color Banding: Band exposed and accessible raceways of systems listed below for identification

1. Bands: Pre-tensioned, snap around, colored plastic sleeves; colored adhesive tape; or combination of both. Make each color band 2 in. (51 mm) wide, completely encircling conduit, and place adjacent bands of 2 color markings in contact, side by side
2. Locate bands at changes in direction, at penetrations of walls and floors, at 50 ft maximum intervals in straight runs, and at 25 ft (7.6 m) in congested areas
3. Colors: As follows:
    a. Fire Alarm System: Red
    b. Fire Suppression Supervisory and Control System: Red and yellow
    c. Combined Fire Alarm and Security System: Red and blue
    d. Security System: Blue and yellow
    e. Mechanical and Electrical Supervisory System: Green and blue
    f. Telecommunications System: Green and yellow

J. Install Caution Signs for Enclosures: Use label indicating system voltage in black, preprinted on orange field. Install on exterior of door or cover with stainless screws

K. Install Circuit Identification Labels on Boxes: Label externally as follows:

1. Exposed Boxes: Plastic label on cover
2. Concealed Boxes: Plasticized card stock tags
3. Labeling Legend: Permanent, waterproof listing of panel and circuit number or equivalent

L. Identify Paths of Underground Electrical Lines: During trench backfilling, for exterior underground power, control, signal, and communications lines, install continuous underground plastic line marker located directly above line at 6 to 8 in. (150 to 200 mm) below finished grade. Where multiple lines installed in common trench or concrete envelope do not exceed an overall width of 16 in. (400 mm), use single line marker

1. Install line marker for underground wiring, both direct buried and in raceway

M. Color Code Conductors: Secondary service, feeder, and branch circuit conductors throughout secondary electrical system

1. Field applied; color coding methods may be used in lieu of factory coded wire for sizes larger than No. 10 AWG
    a. Colored, pressure sensitive plastic tape in half lapped turns for distance of 6 in. (150 mm) from terminal points and in boxes where splices or taps are made. Apply last 2 turns of tape with no tension to prevent possible unwinding. Use 1 in. (25 mm) wide tape in colors as specified. Adjust tape bands to avoid obscuring cable identification markings
    b. Colored cable ties applied in groups of three (3) ties of specified color to each wire at each terminal or splice point starting 3 in. (76 mm) from terminal and spaced 3 in. (76 mm) apart. Apply with special tool or pliers, tighten to snug fit, and cut off excess length

System Voltage	A	B	C	Neutral
120/240 Volt 1Ph/3w	Black	Red		White
120/208 Volt 3Ph/4w	Black	Red	Blue	White
120/240 Volt 3Ph/4w	Black	Orange	Blue	White
277/480 Volt 3Ph/4w	Brown	Purple	Yellow	Grey
Motor Control	1	Black		
	2	Red		
	3	Blue		
	Ground	Green		

N. Power Circuit Identification: Use metal tags or aluminum wraparound marker bands for cables, feeders, and power circuits in vaults, pull boxes, junction boxes, manholes, and switchboard rooms

1. Legend: 1/4 in. (6.4 mm) steel letter and number stamping or embossing with legend corresponding to indicated circuit designations
2. Fasten tags with nylon cable ties; fasten bands using integral ears

O. Conduit Identification: Use aluminum tags with SS bands at termination points such as MCC, light fixtures, control panels, receptacles and junction boxes. Tag is to include conduit tag and panel circuit number (where applicable.)

P. Apply identification to conductors as follows:

1. Conductors to Be Extended in Future: Indicate source and circuit numbers.
2. Multiple Power or Lighting Circuits in Same Enclosure: Identify each conductor with source, voltage, circuit number, and phase. Use color coding for voltage and phase indication of secondary circuit
3. Multiple Control and Communications Circuits in Same Enclosure: Identify each conductor by its system and circuit designation. Use consistent system of tags, color coding, or cable marking tape

Q. Apply warning, caution, and instruction signs and stencils as follows:

1. Install warning, caution, and instruction signs where indicated or required to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved, plastic laminated instruction signs with approved legend where instructions or explanations are needed for system or equipment operation. Install butyrate signs with metal backing for outdoor items
2. Install warning signs on the following equipment as a minimum requirement
    a. MCC Main Breaker
    b. Main Service Breaker
    c. Transfer Switch
    d. Where exposed bus bars inside.
    e. Automatic Power Factor Correction Units

f. VFD's and Solid-state Starters

g. Other locations described in No. 1 above.

3. Emergency Operating Signs: Install engraved laminate signs with white legend on red background with minimum 3/8-inch-high lettering for emergency instructions on power transfer, load shedding, and/or emergency operations

R. Install identification as follows:

1. Apply equipment identification labels of engraved plastic laminate on each major unit of equipment, including central or master unit of each system. This includes communication, signal control, and alarm systems, unless units are specified with their own self-explanatory identification

2. Except as otherwise indicated, provide single line of text with ½ inch high lettering on 1 ½ inch high label; where two (2) lines of text are required, use ½ inch lettering on 2-inch-high label. For small control panels a smaller text may be used but shall be clearly readable. Use black lettering on white field. Use red lettering on white field where shown on plans or as requested by Engineer or Owner. Apply labels with stainless screws for each unit of following categories of equipment.

a. Panelboards, electrical cabinets, and enclosures.

b. Access doors and panels for concealed electrical items

c. Electrical switchgear and switchboards

d. Electrical substations

e. Motor control centers and control panels

f. Motor starters

g. Push button stations

h. Power transfer equipment

i. Contactors

j. Remote controlled switches

k. Dimmers

l. Control devices

m. Transformers

n. Inverters

o. Rectifiers

p. Frequency converters

q. Battery racks

r. Power generating units

s. Telephone equipment

t. Conduits at manholes, at junction boxes, and pull boxes

3. Apply designation labels of engraved plastic laminate for disconnect switches, breakers, push buttons, pilot lights, motor control centers, and similar items for power distribution and control components above, except panelboards and alarm/signal components where labeling is specified elsewhere. For

panelboards, provide framed, typed circuit schedules with explicit description and identification of items controlled by each individual breaker

4. For control panels the nameplate designation shall be according to the control, alarm or status function indicated on the control diagrams, one-line diagrams, details as required in other applicable specifications for this project
5. Provide nameplate designations list and nameplate and text size for Engineer and/or Owner's approval as required by 1.02 of this specification

S. Labeling

1. In addition to requirements for labeling as specified throughout this section, install as follows:
   a. Phase color insulation is required for all conductors, no exceptions
   b. Apply numbered wire marking labels to control wires; power wiring in panelboards, pull and junction boxes, and at outlets to identify circuit numbers. Each control wire shall be labeled at each connection. Labels shall heat shrink type
   c. Apply Phenolic labels with engraved identification to wiring sets in each hand-hole to identify function. Use waterproof labels
   d. Apply write-on identification labels to empty conduits to identify each with information as to terminus of other end and also trade size of conduit.
   e. Install micarta nameplates with engraving to identify function and/or load served for the following:
      i. Panelboards
      ii. Overcurrent Devices
      iii. Power Quality Monitor
      iv. Control Panels
      v. Automatic Transfer Switch
      vi. Wet Well Junction Box
      vii. All components in control panel and SCADA panel
   f. Micarta nameplates shall be attached with aluminum rivets, use two (2) per each nameplate
   g. Submit for review a schedule for engraving along with size for each proposed micarta nameplate. Do not fabricate nameplate until review has been completed
   h. Type circuit directory information on circuit directory cards on all panelboards and laminate

T. Wiring

1. Heat shrink type labels shall be installed to identify circuit numbers from panel boards. Install labels on each wire in each panelboard, junction, and pullbox, and device connection

2. Label each wiring run with heat shrink type labels inside each motor control center and in-service switchboard. Install write-on label ties around wire group at conduit entrance and write-on label the wire size, and service
3. Install numbered marking on each control wiring termination at each terminal strip and at each device. Do this in motor control center, terminal cabinets, safety switches, remote controllers, pilot operators, and instrumentation equipment. Number selected shall correspond to number on terminal strip

END OF SECTION

Section 16060

Grounding and Bonding

PART 1. GENERAL

1.01 SUMMARY

A. This specification is confidentially issued for this specific project only.

B. Contractor shall be responsible for reading all specifications from all disciplines prior to bid.

1.02 REFERENCES

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

1. B3 - Standard Specification for Soft or Annealed Copper Wire
2. B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
3. B33 - Standard Specification for Tinned Soft or Annealed Copper Wire for Electrical Purposes
4. E699 - Standard Criteria for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating Building Components

B. National Fire Protection Association (NFPA): NFPA 780 – Standard for the Installation of Lightning Protection Systems

C. Underwriter’s Laboratories (UL): 467 UL Standard for Safety Grounding and Bonding Equipment

1.03 SUBMITTALS, RECORD DRAWINGS, AND O&M MANUALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

B. Test Results: Report of field tests and observations certified by contractor

PART 2. PRODUCTS

2.01 GROUDNING DEVICES

A. Exothermally welded joints shall be made with Enrico "cadweld"

B. Ground bus connectors shall be Square D type "LU", OZ Type "XLH", or equal

C. Products: Of types indicated and of sizes and ratings to comply with current NEC. Where types, sizes, ratings, and quantities indicated are in excess of current NEC requirements, more stringent requirements and greater size, rating, and quantity indications govern

D. Conductor Materials: Copper

2.02 WIRE AND CABLE CONDUCTORS

A. Conform to NEC Table 8, except as otherwise indicated, for conductor properties, including stranding

B. Equipment Grounding Conductor: Green insulated

C. Grounding Electrode Conductor: Stranded cable

D. Bare Copper Conductors:

1. Solid Conductors: ASTM B3

2. Assembly of Stranded Conductors: ASTM B8

3. Tinned Conductors: ASTM B33

2.03 MISCELLANEOUS CONDUCTORS

A. Ground Bus: Bare annealed copper bars of rectangular cross section

B. Braided Bonding Jumpers: Copper tape, braided No. 30 gage bare copper wire, terminated with copper ferrules

C. Bonding Strap Conductor/Connectors: Soft copper, 0.05-inch-thick and 2 inch wide, except as indicated

2.04 CONNECTOR PRODUCTS

A. General: Listed and labeled as grounding connectors for materials used.

B. Pressure Connectors: High conductivity plated units

C. Bolted Clamps: Heavy duty units listed for application

D. Exothermic Welded Connections: Provide in kit form and select for specific types, sizes, and combinations of conductors and other items to be connected

2.05 GROUNDING ELECTRODES

A. Ground Rods: Copper clad steel with high strength steel core and electrolytic grade copper outer sheath, molten welded to core

1. Size: 3/4 inch by 10 feet unless otherwise indicated.

B. Plate Electrodes: Copper plates, minimum 0.10 in. thick, size as indicated.

PART 3. EXECUTION

3.01 PREPERATION

A. Equipment Grounding Conductor Application: Comply with NEC Article 250 for sizes and quantities of equipment grounding conductors, except where larger sizes or more conductors are indicated

1. Install separate insulated equipment grounding conductors with circuit conductors

a. Raceway may be used as equipment ground conductor where feasible in non-hazardous areas and permitted by current NEC for lighting circuits and receptacle circuits
b. Install insulated equipment ground conductor in nonmetallic raceways unless designated for telephone or data cables

B. Underground Conductors: Bare, tinned, stranded copper except as otherwise indicted

C. Signal and Communications: For telephone, alarm, instrumentation and communication systems, provide #4 AWG minimum green insulated copper conductor in raceway from grounding electrode system to each terminal cabinet or central equipment location

D. Ground separately derived systems required by NEC to be grounded in accordance with NEC Paragraph 25030.

E. Metal Poles Supporting Outdoor Lighting Fixtures: Ground pole to grounding electrode as indicated in addition to separate equipment grounding conductor run with supply branch circuit

F. Connections to Lightning Protection System: Bond grounding conductors or grounding conductor conduits to lightning protection down conductors or grounding conductors in compliance with NFPA 780

G. Common Ground Bonding with Lightning Protection System:

1. Bond electric power system ground directly to lightning protection system grounding conductor at closest point to electric service grounding electrode, using exothermic welded connection

2. Use bonding conductor sized same as system ground conductor and installed in conduit

H. At all water, wastewater and industrial facilities, install UFER grounding per Item 3.02 – “Installation” at all equipment structures and buildings unless specifically deleted

I. Bond all metallic fences, gates, posts, steel structural columns, and other exposed steel structures

J. Install ground rod at all outdoor control panel, service rack, equipment racks, radio tower, steel canopy structures, and other steel structures where electrical equipment is installed

3.02 INSTALLATION

A. Each item of equipment shall be adequately and thoroughly grounded. Comply with Article 250 of N.E.C., except where higher standards of grounding have been specified

B. Equipment grounding conductors (EGC) shall be installed where indicated. These wires shall be green colored for all sizes

C. EGC runs into equipment and shall be grounded to equipment bus where available, or to equipment ground lugs

D. Where grounding type myers hub are installed, bond EGC thereto and furthermore ground each myers hub lug to equipment ground bus or ground lug, or ground rod

E. In each motor terminal box, install equipment ground lug and connect EGC thereto

F. In each floodlight pole, install ground connector to pole and bond to conduit bushing and to EGC in branch circuit

G. Install grounding conductor in all raceways and ground at both ends

H. General: Ground electrical systems and equipment in accordance with current NEC requirements except where Drawings or Specifications exceed NEC requirements

I. Ground Rods:

1. Locate minimum of one rod length from each other and at least same distance from any other grounding electrode
2. Interconnect ground rods with bare conductors buried at least 24 in. below grade
3. Connect barecable ground conductors to ground rods by means of exothermic welds
4. Make connections without damaging copper coating or exposing steel
5. Use 3/4inch by 10ft. ground rods except as otherwise indicated.
6. Drive rods until tops are 6 inches below finished floor or final grade except as otherwise indicated

J. Metallic Water Service Pipe:

1. Provide insulated copper ground conductors, sized as indicated, in conduit from building main service equipment, or ground bus, to main metallic water service entrances to building
2. Connect ground conductors to street side of main metallic water service pipes by means of ground clamps
3. Bond ground conductor conduit to conductor at each end

K. Braided Type Bonding Jumpers: Use elsewhere for flexible bonding and grounding connections

L. Route grounding conductors along shortest and straightest paths possible without obstructing access or placing conductors where they may be subjected to strain, impact, or damage, except as indicated

M. Test Wells: Locate as indicated, and fabricate in accordance with details indicated

N. UFER Ground:

1. Fabricate with 20 feet of bare 2/0 (minimum) copper conductor laid lengthwise in excavation for foundation or footings
2. Install so conductor is within 2 in. of bottom of concrete
3. Where base of foundation is less than 20 feet in length, coil excess conductor at base of foundation

4. Bond conductor to reinforcing steel at four locations, minimum. Bond to all electrical equipment
5. Extend conductor below grade and connect to building grounding grid or grounding electrode
6. Extend to all steel support columns for buildings, equipment structures or roof columns
7. Alternate UFER Grounding: Install 2/0 (minimum) bare copper conductor in 24” deep trench around perimeter of structures, buildings, slabs, and foundations where electrical or mechanical equipment is located. Install 4 ft. from edge of structure. Bond to all steel structure and equipment and to grounding system, using exothermic welded connections
8. Do not install ground grid conductors in or under existing concrete adjacent to generators electrical equipment without written approval from Engineer

3.03 CONNECTIONS

A. General: Make connections to minimize possibility of galvanic action or electrolysis. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible

1. Use electroplated or hot tin coated materials to assure high conductivity and make contact points closer in order of galvanic series
2. Make connections with clean bare metal at points of contact
3. Aluminum to steel connections: stainless steel separators and mechanical clamps
4. Aluminum to galvanized steel connections: tinplated copper jumpers and mechanical clamps
5. Coat and seal connections involving dissimilar metals with inert material such as red paint to prevent future penetration of moisture to contact surfaces

B. Exothermic Welded Connections:

1. Use for connections to structural steel, water tanks, equipment, generators and enclosures, and for underground connections
2. Install at connections to ground rods and plate electrodes.
3. Comply with manufacturer’s written recommendations. Use CAD-Weld or approved equal
4. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable

C. Terminations:

1. Terminate insulated equipment grounding conductors for feeders and branch circuits with pressure type grounding lugs

2. Where metallic raceways terminate at metallic housings without mechanical and electrical connection to housing, terminate each conduit with grounding bushing
3. Connect grounding bushings with bare grounding conductor to ground bus in housing
4. Bond electrically non-continuous conduits at both entrances and exits with grounding bushings and bare grounding conductors

D. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values for connectors and bolts. Where manufacturer's torqueing requirements are not indicated, tighten connections to comply with torque tightening values specified in UL 486A-486B

E. Connections at Test Wells: Refer to details for connections between conductors and ground rods

F. Compression Type Connections: Where compression type connections are specifically called for on plans, use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by manufacturer of connectors. Provide embossing die code or other standard method to make visible indication that connector has been adequately compressed on ground conductor

G. Moisture Protection: Where insulated ground conductors are connected to ground rods or ground buses, insulate entire area of connection and seal against moisture penetration of insulation and cable

3.04 OVERHEAD LINE GROUNDING

A. General: Comply with ANSI C2, "National Electrical Safety Code"; for "Single Grounded Systems"; using two electrodes in parallel if single electrode resistance to ground exceeds 25 ohms

B. Ground Rod Connections: Use exothermic welds for underground connections and connections to rods.

C. Lightning Arresters: Separate arrester grounds from other ground conductors.

D. Secondary Neutral and Tank of Transformer: Interconnect and connect to ground.

E. Grounding Conductor Protection: Protect grounding conductors running on surface of wood poles with molding of a type manufactured for this purpose. Extend from grade level up to and through communications and transformer spaces

3.05 UNDERGROUND DISTRIBUTION SYSTEM GROUNDING

A. Manholes and Handholes:

1. Install 3/4inch by 10ft. driven ground rod in corner close to wall and set rod depth such that 4 inches will extend above finished floor

2. Where necessary, install ground rod before manhole is placed and provide No. 1/0 bare tinned copper conductor from ground rod into manhole through waterproof sleeve in manhole wall
3. Protect ground rods passing through concrete floor with double wrapping of pressure sensitive tape or heat shrunk insulating sleeve from 2 in. above to 6 in. below concrete
4. Seal floor opening with waterproof non-shrink grout.

B. Connections at Manholes:

1. Connect exposed metal parts, such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole to ground rod or ground conductor
2. Make connections with minimum No. 4 AWG stranded hard drawn copper wire
3. Train conductors' plumb or level around corners and fasten to manhole walls.
4. Connect to cable armor and cable shields by means of tinned terminals soldered to armor or shield, or as recommended by manufacturer of splicing and termination kits

C. Grounding System: Ground noncurrent carrying metallic items associated with manholes, substations, and pad mounted equipment by connecting them to bare underground cable and grounding electrodes arranged as indicated.

3.06 SITE QUALITY CONTROL

A. Test:

1. Subject completed grounding system to megger test at each location where maximum ground resistance level is specified, at service disconnect enclosure ground terminal, and at ground test wells
2. Measure ground resistance without soil being moistened by any means other than natural precipitation or natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance
3. Perform tests by 2point method in accordance with Section 9.03 of IEEE 81, "Guide for Measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Grounding System"

B. Ground/resistance maximum values shall be as follows:

1. Equipment rated 500 kVA and less: 10 Ohms.
2. Equipment rated 500 kVA to 1000 kVA: 5 Ohms.
3. Equipment rated over 1000 kVA: 3 Ohms.
4. Unfenced substations and pad mounted equipment: 5 Ohms.
5. Manhole grounds: 10 Ohms.

C. Deficiencies: Where ground resistances exceed specified values, notify Engineer, and if directed by Engineer, modify grounding system to reduce resistance values.

Where measures are directed that exceed those indicated, provisions of Contract covering changes will apply

D. Report: Prepare test reports, certified by testing organization, of ground resistance at each test location. Include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results

3.07 RESTORATION

A. Restore surface features at areas disturbed by excavation and reestablish original grades except as otherwise indicated

B. Where sod has been removed, replace it as soon as possible after backfilling is completed

C. Restore areas disturbed by trenching, storing of dirt, cable laying, and other Work to their original condition

D. Include necessary top soiling, fertilizing, liming, seeding, sodding, sprigging, or mulching

E. Restore disturbed paving as indicated

END OF SECTION

Section 16121

Low-voltage Conductors and Cables

PART 1. GENERAL

1.01 SUMMARY

A. This specification is confidentially issued for this specific project only

B. Contractor shall be responsible for reading all specifications from all disciplines prior to bid

1.02 REFERENCES

A. American National Standards Institute/National Fire Protection Association (ANSI/NFPA), NFPA 70 - National Electrical Code (NEC):

1. Article 310 - Conductors for General Wiring
2. Article 200 – Use and Identification of Grounded Conductors

B. EPA, 40CFR, Part 261.24 Toxicity Characteristic

C. CSA FT-4 Vertical Cable Tray Flame Tests

D. Underwriter's Laboratories (UL)

1. UL 44: Rubber Insulated Wires and Cables
2. UL 83: Thermoplastic Insulated Wires and Cables
3. UL 514 B: UL Standard for Safety Conduit, Tubing, and Cable Fittings
4. UL 1063: Machine Tool Wires and Cables
5. UL 1277: Standard for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members
6. UL 1581: Reference Standard for Electrical Wires, Cables, and Flexible Cords

E. American Society for Testing and Materials (ASTM)

1. ASTM B3: Soft or Annealed Copper Wires
2. ASTM B8: Concentric-Lay-Stranded Copper Conductors, Hard, Medium Hard, Soft
3. ASTM B33: Tinned soft or annealed copper wire for electrical purposes

F. Institute of Electrical and Electronics Engineers (IEEE), IEEE 383-2.5: IEEE Standard for Type Test of Class IE Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations

G. IEEE 383: Vertical Wire Flame Test

H. IEEE 1202: Flame testing of cables for use in cable tray

I. Insulated Cable Engineers Association (ICEA)

1. ICEA S-61-402: Thermoplastic- Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (NEMA WC5)
2. ICEA S-66-524: Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (NEMA WC-7)
3. ICEA S-68-516: Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (NEMA WC-8)
4. ICEA S-95-658 Non-shielded Power Cable Rated 2000 Volts or Less
5. ICEA T-29-520 Flame Test

1.03 SUBMITTALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

1.04 RECORD DRAWINGS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

1.05 OPERATIONS & MAINTENANCE MANUALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

1.06 QUALITY ASSURANCE

A. Tests:
1. Cable shall meet all the requirements of Part 6 of ICEA S-61-402
2. Cable shall be tested at the factory to confirm that the cable complies with requirements of ICEA Section 7.7.9 of S-66-524 or 7.5.9 of S-68-516
3. Where applicable, the cable shall meet the requirements of the vertical tray flame test as described in IEEE 383-2.5

PART 2. PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Belden
B. Cerrowire
C. General Cable
D. Okonite Company
E. Service Wire Drive VFD Cable
F. Southwire
G. Or approved equal

2.02 MATERIALS AND EQUIPMENT

A. Design:

1. Provide cable designated as THWN/THHN or XHHW single conductor type and UL 83 and UL 1063 listed, rated 600 volts and certified for continuous operation at maximum conductor temperature of 90° C in dry locations and 75° C in wet locations while installed in underground duct, conduit or in control panels (MTW). Use XHHW, 90° rated conductors for main service or feeders

2. Provide cable with the following design characteristics. The cable shall consist of multiple conductors. The cable assembly shall be UL listed, flame, oil, and sunlight resistant, and certified for continuous operation at the temperature specified in wet or dry locations while installed in underground duct, conduit, or cable tray. The number and size of conductors supplied in each cable shall correspond to the quantities specified. Each conductor shall be individually insulated. Pairs and triads shall have conductors, which are twisted together with a drain wire, shielded, and covered with a jacket. Multi-pair/triad cables shall consist of the required number of electrically isolated, shielded pairs or triads, which are bundled together and covered by an overall jacket as specified

B. Conductors:

1. Provide conductors, which are Class B, concentric stranded, annealed un-coated copper with physical and electrical properties complying with ASTM B3 and B8 and Part 2 of ICEA S-61-402, S-66-524, or S-68-516, unless otherwise specified

C. Insulation:

1. Each conductor shall be PVC insulated and nylon jacketed to meet the requirements of Part 3 of ICEA S-61-402. The insulation thickness shall match the dimensions listed in NEC Table 310-13 for type THHN and THWN wire

2. Each conductor shall be insulated as specified in compliance the requirements of Part 3 of ICEA S-61-402, S-66-524, or S68-516. The average insulation thickness shall not be less than the dimensions shown in Table 7-32 or 7.5.1 of ICEA S-66-524 or S-68-516 for 600-volt insulation unless otherwise specified. The minimum insulation thickness shall not be less than 90 percent of the value given in the table

D. Shielding:

1. Provide shielding consisting of laminated, non-burning, mylar-backed aluminum tape applied helically around a twisted pair or triad with the aluminum side in continuous contact with the drain wire unless otherwise specified. Wrap the tape around each twisted pair or triad with a 25 percent minimum overlap unless otherwise specified

E. Drain Wire:

1. Provide drain wire, which is Class B, seven-stranded, tin-coated copper in accordance with ASTM B3, B8, or B33 and as specified. The drain wire shall not be less than two AWG sizes smaller than the insulated conductor's size, except for multiple pair triad drain wires, which shall not be less than the insulated conductor size

F. Jacket:

1. The physical and electrical properties of the jacket used to cover single or multipair or triad cables shall meet the requirements of section 7.7.7 or ICEA S-66-524 or section 7.5.6 of ICEA S-68-516. Jacket material as specified. The jacket thickness shall be equal to the dimensions shown in Table 7-33 or 7.5.2 of ICEA S-66-524 or S-68-516

G. Armor:

1. Where requested, use instrumentation cables protected by an interlocked metal tape armor coating made of galvanized steel, which meets the requirements of paragraph 4.5 of ICEA S-68-516 or S-66-524, unless otherwise specified

H. Wire Marking:

1. Wire marking shall be in accordance with NEC Article 310-11 and shall be printed on the wire insulation at 2-foot intervals
2. The printing method used shall be permanent and the color shall sharply contrast with the jacket color
3. Use individual conductors in single-pair and single-triad cables, which are, color coded black and white; and black, white and red, respectively. Multi-pairtriad cables shall have one conductor in each pair or triad colored white, and all other conductors are color coded in sequence according to Table L-2 of Appendix 2 of ICEA S66-524, and as specified
4. Print cable marking information on the jacket of each cable at 2-foot intervals. Use a permanent printing method with color sharply contrasting the jacket color

I. The single conductor color coding shall be as follows:

System Voltage	A	B	C	Neutral
120/240 Volt 1Ph/3w	Black	Red		White
120/208 Volt 3Ph/4w	Black	Red	Blue	White
120/240 Volt 3Ph/4w	Black	Orange	Blue	White
277/480 Volt 3Ph/4w	Brown	Purple	Yellow	Grey
Motor Control	1 Black			
	2 Red			

3	Blue
Ground	Green

J. VFD cables are to be selected and provided for AC motor drive duty and shall be rated at voltage listed in VFD Manufacturer's data sheets

K. All service and feeder conductors to be XHHW-2

L. All conductors shall be soft-drawn, stranded annealed copper that meets ANSI 44, ASTM B3-74/38-72

M. Insulation for all 480Vconductors, insulated equipment grounding conductors and control conductors shall be type XHHW-2 For dry and wet locations; maximum operating temperature shall be 90°C. Meet UL 44 and Federal Spec A-A-59544

N. All power conductor cables shall have phase colored insulation

O. Insulation for all 120/240V conductors, insulated equipment grounding conductors and control conductors shall be type XHHW-2 For dry and wet locations; maximum operating temperature shall be 90°C. Meet UL 44 and Federal Spec A-A-59544

P. Multiconductor shielded cables shall be polyethylene insulated tinned copper conductors within an aluminum-polyester shield tinned copper drain wire and a chrome PVC jacket. Shield shall provide 100% coverage. Cables shall be UL style 2092 and shall be Beldon Beldfoil #8760 or equal, with number of conductors shown. Minimum conductor size shall be #18AWG

Q. Multiconductor signal cables shall consist of twisted pairs of insulated copper conductors, size and number of pairs as indicated, with a petroleum-polyethylene compound which fills all cable interstices, a non-hygroscopic core tape, .005" copper shield and a polyethylene jacket. Cable shall be manufactured to REA Specification PE-39 for REA designation BJCF cables and shall be Okonite type KTC-F or equal

R. All control panel wiring shall be tinned stranded #14 AWG minimum size conductors for controls with type SIS insulation

S. Ethernet cable to be CAT6

2.03 INSULATING PRODUCTS

A. Tape products shall be furnished as hereinafter specified and shall be Plymouth, Okonite, F.E., 3M, or equal

B. General purpose electrical tape shall be 7 mil thick stretchable vinyl plastic, pressure adhesive type, "slipknot Grey", 3M Scotch 33+, or equal

C. Insulating void-filling tape and high voltage bedding tape shall be stretchable ethylene propylene rubber with high-tack and fast fusing surfaces. Tape shall be rated for 90 degrees Celsius continuous, 130 degrees Celsius overload, and shall be moisture-proof void filling tape shall be "plysafe", 3M Scotch 23, or equal

D. High temperature protective tape shall be rated 180 degrees Celsius continuous indoor/outdoor, stretchable, self-bonding silicone rubber. High temperature tape shall be "Plysil #3445", 3M Scotch 70, or equal

E. Insulation putty filler-tape shall be Plymouth #2074, 3M, or equal

2.04 WIRING DEVICES

A. All wiring devices shall be specification grade and shall meet NEMA WD 1-1971 requirements. Furnish following types unless otherwise indicated

B. GFI receptacles shall be 20A duplex receptacle in a duplex body containing reset and test pushbuttons. Furnish Square D "GFCI-WR", or equal

C. Single-pole, single throw, 20A toggle switch shall be Arrow-Hart #1791, Hubbell #1221, or equal

D. Door switch, single-throw pressure sensitive shall be Pass & Seymour #1205, or equal

E. Wiring devices are to be ivory in color

2.05 MISCELLANEOUS MATERIAL

A. Cable grips shall be 316 stainless steel, grip-type wire mesh with machined metal support. Furnish Kellems, Appleton, or equal products

B. Conduit pull-cords for use in empty raceways shall be glass-fiber reinforced tape with foot-marked along its length. Furnish Thomas, Greenlee, or equal products

C. Conduit thread coating compound shall be conductive, non-galling, and corrosion-inhibiting and applied to all threads. Furnish Crouse-Hinds type "STL", Appleton type "ST", Noalox, Penetrox or equal

D. Wire pulling compound shall be non-injurious to insulation and to conduit and shall be lubricating, non-crumbling, and non-combustible. Furnish clear wire pulling compound

E. Plastic compound for field-coating of ferrous material products shall be PVC in liquid form that sets-up semi-hard upon curing. Furnishing Rob Roy "rob Kote", Sedco "Patch Coat", or equal

F. Zinc spray for coating electrogalvanized steel products shall be Research Laboratory type "LPS", Mobil "Zinc-spray", or equal

G. Splicing kit shall be provided with insulating and sealing compound to provide a moisture-tight splice. Provide Scotchcast Series 82 or equal splicing kit

2.06 CONNECTORS

A. Power connectors shall be insulated tap connectors. Furnish NSI Polaris connectors with no equals

B. Insulated silicone filled spring-wire connectors, "wire-nuts", for small building wire taps and splices shall be plated spring steel with thermoplastic jacket. Connector shall be rated at 150 degrees Celsius continuous. Furnish 3M "or equal

C. Insulated set-screw connectors shall consist of copper body with flame-retardant plastic insulated shield. Furnish Ideal, T&B, or equal

D. Connectors for control conductor connections to screw terminals shall be crimp-type with vinyl insulated barrel and tin-plated copper ring-tongue style connector. Furnish T&B "Sta-kon", 3M "Scothlok", or equal

2.07 VFD RATED CABLE AND CONNECTORS

A. General

1. Provide power and control multiconductor and connector system for variable frequency drives with service in a corrosive industrial environment up to 600V AC.

B. Scope

1. (3) copper phase conductors with 2kV RHW-2 90° C insulation
2. (3) equally spaced bare copper equipment grounding conductors
3. Helically applied copper tape shield with minimum 50 percent overlap
4. Outer jacket
5. Connectors and accessories
6. Termination Kits
7. The minimum cable bending radius shall be a maximum of 10 times the overall cable diameter

C. Conductors

1. Conductor shall be the size specified, made of soft annealed stranded bare or tinned copper with Class B concentric stranding in accordance with ICEA (Insulated Cable Engineers Association) S-95-658, Tables 2-1, 2-3, and G-2.

D. Conductor Insulation

1. Phase conductor insulation shall be moisture resistant, flame-retardant cross-linked polyethylene (2kV RHW-2) suitable for 90° C conductor temperature operation in dry, damp and wet locations. Thermoplastic and non-flame-retardant insulations are not acceptable. The minimum insulation thickness shall not be less than 90% of the minimum average thickness shown in Section 6.0.

E. Fillers

1. Fillers of nonconductive and nonmetallic material may be cabled with the conductors to make the finished cable round and firm at all points as described in UL 1277, section 10.2.1.

F. Ground Wires

1. Ground wires for (3) conductor cables shall be three bare or tinned copper wires, one located in each interstice and equidistant from the phase conductors.

G. Shield

1. A copper tape shield shall be provided over the cable core and below the outer jacket. The tape shield shall be helically applied minimum 5 mils thick bare copper with minimum 50% overlap to assure full coverage at the cable bends.

H. Outer Jacket

1. The outer jacket shall be solid black and shall be moisture, chemical and sunlight resistant. Thermoset (e.g. CSPE or CPE-TS), thermoplastic (e.g., PVC or CPE-TP) and Low Smoke Zero Halogen (LSZH) jacket materials are acceptable. The minimum jacket thickness shall meet or exceed the requirements of ICEA S-93-658, Table 4-4.

I. Identification

1. Identification shall consist of readable printing on the cable jacket indicating number and size of conductors, cable type, voltage, UL listing, manufacturer's cable number and name, and year of manufacture.
2. Phase identification shall comply with either ICEA method 3 (black, red and blue insulation) or method 4 (surface printing of numbers).

J. Connectors

1. The cable systems' connectors shall be watertight, and UL listed for installation.
2. The connector body material shall be nickel clad aluminum. The cable connector shall provide a 360-degree electrical bonding of the copper tape shield to the connector body.
3. Connection of the copper tape shield to the connector body shall be accomplished by an integral and self-retaining grounding collar that automatically provides a 360-degree connection as the connector is tightened. The connector assembly shall be designed to ensure against loosening of threads due to vibration.
4. A UL listed chrome plated grounding and bonding locknut with a 360-degree knurled teeth connection shall be provided with each connector to secure and bond the connector to the inverter cabinet / motor termination box. In addition, tinned copper braids (minimum ¾ inches wide) with installation hardware to connect the copper tape shield to the inverter enclosure / backpanel and to the motor frame shall be provided as part of the cable system.

K. Termination Kits

1. Tinned copper braids (minimum ¾ inches wide) with installation hardware to connect the copper tape shield to cable core, to the inverter enclosure / back-panel, and to the motor frame shall be provided as part of the cable system.
2. Braid width shall be determined by cable core diameter size and shall be placed at a separation of 180 degrees.

L. DOCUMENTATION

1. The cable manufacturer shall provide clear and concise cable / connector installation instructions (including cable termination / connector assembly

instructional DVD) and generic guidelines on how to ensure a long-term high frequency bond connection between the motor frame and drive backplane. The vendor shall furnish pictures of typical installations with proper high frequency bonding.

PART 3. EXECUTION

3.01 TESTING

A. Tests:

1. In general, test insulation integrity of the wiring system before terminating
2. Make sure to disconnect sensitive electronic equipment before testing insulation
3. Use a 500 VDC megohmmeter and perform the wire system insulation test in accordance with the operating instructions
4. Before connecting the cables, test insulation integrity and conductor continuity
5. All cables shall have an insulation test performed using 1000-volt megger that has been calibrated within the last twelve months.
6. Cables installed with an insulation reading less than 500 megohms shall be removed and new cable installed and retested at no additional cost to the owner.
7. Cables installed with an unacceptable insulation reading shall be removed and new cable installed and retested at no additional cost to the owner. Submit cable megger test report to owner's representative.
8. The grounding system shall be be tested in the presence of the owner's representative using the fall of potential method and shall provide a grounding system resulting in an ohmic value of five (5) ohms or less at no additional cost to the owner. The contractor shall submit test report to owner's representative. Test equipment must be calibrated within the previous 12 months. Provide dated calibration results along with submittal.

3.02 PREPERATION

A. Ship wire and cable on manufacturer's standard reel sizes unless otherwise specified. Where cut lengths are specified, mark reel footage accordingly. Each reel shall contain one continuous length of cable. Provide impact protection by wood lagging or suitable barrier across the traverse of the reel. Provide moisture protection by using manufacturer's standard procedure or heat shrinkable self-sealing end caps applied to both ends of the cable

B. Complete the cable raceway systems and underground duct banks before installing cables

C. Verify sizing of raceways and pull boxes to ensure proper accommodation for the cables

D. Check the length of the cable raceway system against the length of cable on the selected reel

E. Clean conduits of foreign matter before cables are pulled

F. Preparation for termination:

1. Make 600-volt power cable terminations and splices with heat shrinkable sleeves and seals
2. Terminal lugs and connectors for all sizes of conductors shall be crimp-on type
3. For size 1/0 AWG and larger, crimp-on lugs shall have the long barrel with 2-hole tongues except in places where termination space is limited

G. Do not install or work on PVC insulated or jacketed cables in temperatures below 32-degrees F

H. Provide at least 30 percent spare conductors or pairs

3.03 INSTALLATION

A. Wiring Methods

1. Use wiring methods indicated on the Drawings
2. In general, use THHN/THWN or XHHW building wire for lighting, power and control wiring where conductors are enclosed in raceways such as above ground conduit system, underground duct banks, or inside control panels. Use XHHW, 90° rated conductors for main service or power and motor feeders
3. Do not use solid conductors
4. Use conductors no smaller than No. 12 AWG stranded for lighting circuits indoors and not smaller than No. 10 AWG stranded for outdoors. Use No. 10 AWG (minimum) for outdoor receptacles on structures or poles
5. Use conductors no smaller than No. 14 AWG for control circuits, except when part of a multi-conductor cable or internal panel wiring
6. In general, do not splice conductors. All conductors must be one continuous length from starting point to end point without splices, unless prior written approval by Engineer
7. Splices associated with taps for lighting and control circuits are allowed without approval
8. Make splices in accessible junction boxes located above ground. Do not splice power and control conductors in underground pull boxes or manholes, unless specifically allowed. Any slices allowed in underground boxes shall be made using 3M liquid tight kits specifically made to withstand submergence in water. Any conductors allowed to be spliced in underground boxes shall have conductors elevated to near top of wall
9. Wire nuts with insulated caps may be used for lighting wiring splices located in wall boxes, switch boxes, and receptacle boxes, but not in control panels,

MCC's or underground boxes. Splice control circuit with insulated crimp connectors

10. All conductors routed in manholes, electrical vaults and underground pull boxes shall be routed around walls and supported by nonmetallic fiberglass strut that is bolted vertically to walls at intervals not less than two per wall. Do not use horizontal arms unless specifically called for. Support conductors with stainless steel bands made for the purpose of supporting conductors, or with large wide nylon Ty-Wraps. Under no conditions shall conductors be routed directly across length of box. Any conductors routed otherwise shall be removed and replaced at Contractors expense. Splicing in UG pull boxes, manholes or vaults is prohibited without written approval by Engineer

B. Single Conductor in Conduit and Ductbank

1. Install cables in accordance with the manufacturer's instructions and NEC Chapter 3 - Wiring Methods and Materials. Do not exceed maximum wire tension, maximum insulation pressure and minimum bending radius
2. Pull cables into conduits using adequate lubrication to reduce friction. Lubricants must not be harmful to the conductor insulation
3. Splices are not allowed in manholes

C. Single Conductor in Cable Tray:

1. Do not install single conductor building wire and cable in cable tray. All conductors to be tray rated composite cable type

D. Multi-Conductor Shielded VFD Rated Cable:

1. Install cables in accordance with the manufacturer's instructions
2. Pull cables into conduits using adequate lubrication to reduce friction. Lubricants must not be harmful to the conductor insulation
3. Do not splice cables unless specifically shown on plans. Provide as one continuous length. Where splicing is shown on plans or approved, use mechanical compressing tools and splice barrels only, and tape connections
4. All cables and conductors routed thru UG pull boxes or manholes shall be routed around walls and secured on racks. See plans for details

E. Termination:

1. After the 600-volt wiring system has been tested with satisfactory results, reconnect wire
2. Do not splice conductors. For termination use crimp-on type ring tongue non-insulated tin-plated copper lugs
3. For shielded control cable, terminate the shield and ground it at one end only, preferably at the control panel end for instrument and communication cable and at the supply end for electronic power cables

4. If splicing is required, maintain shield continuity by jumpering the ground shield across connection point where it is broken at junction boxes, or other splice points. Insulate these points from ground
5. Mark wiring on both ends with circuit numbers or loop tag numbers. Heat shrink wire markers after the ring tongue terminal has been installed. Extend the marker over the crimp or base of the terminal

F. Conductors shall be sized as shown and where no size is indicated, the conductor size shall be size #12 AWG

G. Insulation for all conductors, insulated equipment grounding conductors and control conductors shall be stranded copper type XHHW-2 for dry and wet locations; maximum operating temperature shall be 90°C (XHHW-2). UL listed as gasoline and oil resistant. PVC insulation with nylon outer jacket. Meet UL 83 and Federal Spec J-C-30B

H. Branch circuits may be spliced for receptacle and lighting loads inside appropriate junction boxes. All control and power cables shall be run continuous without splices except where approved by the engineer

I. Except as otherwise specified, taps and splices for receptacles and lighting shall be made with silicone filled spring wire connectors

J. Motor connections and all taps and splices other than for receptacle and lighting shall be made with the appropriate NSI Polaris series connectors

K. Control wiring connections to stud type and screw type terminals shall be made with ring-tongue type crimp connectors. Label each terminal jacket with wire marking label at each connection

L. Each wire connection shall be made up tightly so that resistance of connection is as low as equivalent length of associated conductor resistance

M. All wiring inside enclosures will be neatly trained and laced with nylon tie-wraps

N. All wiring shall be installed in raceways except inside the wet well; however, no wire shall be drawn into a conduit until all work of a nature which may cause injury is completed. Do not exceed wire and cable manufacturer's recommended pulling tensions. A cable pulling compound shall be used as a lubricant and its composition shall not affect the conductor or its insulation

O. Install wiring devices where indicated. Wiring devices shall be type as indicated

P. Each wiring device shall be set with axis plumb and installed with yoke screw so as to adequately support device yokes to the box. Install ground prong pointed up

Q. Device boxes shall be type FS or FD cast aluminum

R. Use aluminum ganged boxes for ganged devices. “Type FD sand cast aluminum boxes are required

S. Each device box shall be equipped with specified aluminum cover and 316 S.S. hardware

3.04 REPAIR/RESTORATION

A. Inspection of Conductors

B. All conductors shall be inspected for damage after pulled in conduit. Where damage is deemed excessive by Engineer, conductors shall be replaced for entire length of run

C. Where damage is due to condition of conduits, Contractor may be requested to provide a televised inspection of conduits at no additional cost to Owner and where deemed necessary by Engineer, any damaged conduits shall be replaced at no additional cost to Owner

END OF SECTION

Section 16131

Raceways and Boxes

PART 1. GENERAL

1.01 SUMMARY

A. This specification is confidentially issued for this specific project only

B. Contractor shall be responsible for reading all specifications from all disciplines prior to bid

C. This specification will cover device boxes, pull boxes, junction boxes, and raceways not covered in other sections

1.02 REFERENCES

A. American National Standards Institute/National Electrical Manufacturers Association (ANSI/NEMA)

1. FB1 - Fittings and Support for Conduits and Cable Assemblies
2. 250 - Enclosures for Electrical Equipment (1000 volts maximum)

B. American National Standards Institute/National Fire Protection Association (ANSI/NFPA), NFPA70 - National Electrical Code (NEC) - Article 314 – outlet device, pull and junction boxes, conduit bodies and fittings

C. Underwriters Laboratories (UL):

1. 50 - Safety Cabinets and Boxes
2. 508 - Safety Industrial Control Equipment
3. 514B - Safety Fittings for Conduit and Outlet Boxes
4. 886 - Safety Outlet Boxes and Fittings for Use in Hazardous Areas.

1.03 SUBMITTALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

B. Installation instructions

C. Dimensions and weights

1.04 RECORD DRAWINGS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

1.05 OPERATIONS & MAINTENANCE MANUALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

PART 2. PRODUCTS

2.01 ACCEPTABLE MANUFACTURER'S

A. Sheet Metal Boxes
   1. Hoffman Industrial Products
   2. Robroy
   3. Eaton/Crouse-Hinds
   4. Rittal

B. Cast Device Boxes
   1. Appleton Electric Company
   2. Eaton/Crouse-Hinds
   3. Hubbel/Killark

C. Pull box
   1. Oldcastle
   2. Cesco
   3. Rexel USA
   4. Utility Concrete Porducts
   5. Jensen Precast
   6. Or approved equal

2.02 MATERIALS AND EQUIPMENT

A. Sheet metal boxes
   1. Provide UL-approved junction boxes and pull boxes manufactured from stainless steel sheet metal and meeting requirements of NEMA 4X for corrosive and wet areas, NEMA 250 and NEC Article 314. Enclosures located outdoors or in environmentally harsh or wet locations shall be NEMA 4X 316 stainless steel
   2. Provide boxes with a stainless-steel continuous hinge, closure hasps and all stainless-steel hardware
   3. Furnish the door with neoprene gasket and provision for padlock

B. Device boxes
   1. Provide UL-approved boxes designed and manufactured to house electrical devices like receptacles and switches, and in conformance with NEMA FB1 and NEC Article 314

2. Supply boxes that are hot dip galvanized on cast iron suitable for corrosive and wet atmosphere
3. All boxes located in environmentally harsh or wet or outdoor locations shall be NEMA 4X 316 stainless steel
4. All boxes located in chemical rooms shall be H.D. PVC only
5. Where unprotected service conductors are routed through a pull box with other conductors a divider wall shall be provided in the pull box for separation as required by the NEC

C. Hardware
1. Mounting Hardware: Stainless steel
2. Conduit Connectors: Watertight as manufactured by Myers Hubs, or equal

D. Pull Box
1. Minimum size 24” x 24”
2. Pull box shall be traffic rated
3. Pull box shall be aircraft rated where shown on plans
4. Modular construction
5. Base/bottom section
6. Lockable cover

PART 3. EXECUTION

3.01 PREPERATION

A. Pack and crate boxes to permit ease of handling and to provide protection from damage during shipping, handling, and storage

B. Review the drawings and determine how many boxes of each kind are required and check if supplied quantity is sufficient

3.02 INSTALLATION

A. Boxes described in this specification shall be used both in dry and wet, corrosive areas, both inside and outside locations

B. B. Install boxes in accordance with NEC Article 314 in locations indicated on the Drawings

C. Install junction and pull boxes in readily accessible places to facilitate wire pulls, maintenance, and repair

D. Plug unused conduit openings

E. Make conduit connections to sheet metal boxes with watertight conduit connectors

F. Size underground pull boxes and manholes large enough to allow cables and conductors to be routed around walls and supported on wall racks. See plans for

details. Do not use arms on mounted racks, except for MV cables or large multiple 600 Volt cables. Do not cross and occupy middle of pull box or manhole with cables or conductors

END OF SECTION

Section 16132

Conduit, Fittings, and Bodies

PART 1. GENERAL

1.01 SUMMARY

A. This specification is confidentially issued for this specific project only

B. Contractor shall be responsible for reading all specifications from all disciplines prior to bid

C. This specification covers all requirements for conduits, fittings, and bodies for various service and electrical equipment

D. All equipment described herein shall be submitted, and factory installed, as an integral part of equipment specified in overall construction documents

1.02 PRICE AND PAYMENT PROCEDURES

A. No separate payment for work performed under this section. Include cost for conduits, fittings, and bodies in overall electrical equipment

1.03 REFERENCES

A. American National Standards Institute (ANSI)

1. ANSI C80.1: Rigid Steel Conduit - Zinc Coated
2. ANSI C80.4: Fittings for Rigid Metal Conduit

B. Federal Specifications

1. W-C-58C: Conduit Outlet Boxes, Bodies Aluminum, and Malleable Iron
2. W-C-1094A: Conduit and Conduit Fittings Plastic, Rigid
3. WW-C-566C: Flexible Metal Conduit
4. WW-C-581E: Coatings on Steel Conduit

C. National Electrical Manufacturers Association (NEMA)

1. NEMA RN1: Polyvinyl Chloride Externally Coated Galvanized Rigid Steel Conduit and Electrical Metallic Tubing
2. NEMA TC2: Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)
3. NEMA TC3: PVC Fittings for Use with Rigid PVC Conduit and Tubing

D. National Fire Protection Association (NFPA), ANSI/NFPA 70 - National Electrical Code (NEC)

E. Underwriters' Laboratories (UL)

1. UL 1: Flexible Metal Electrical Conduit

2. UL 6: Rigid Metal Electrical Conduit
3. UL 514B: Fittings for Conduit and Outlet Boxes
4. UL 651: Schedule 40 and 80 Rigid PVC Conduit
5. UL 651A: Type EB and A Rigid PVC Conduit and HDPE Conduit
6. UL 886: Electrical Outlet Boxes and Fittings for Use in Hazardous Locations

F. ETL verified PVC-001 for PVC coated rigid steel conduit

1.04 SUBMITTALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

1.05 RECORD DRAWINGS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

1.06 OPERATIONS & MAINTENANCE MANUALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

1.07 QUALITY ASSURANCE

A. Tests:

1. Rigid steel conduit shall pass the bending, ductility, and thickness of zinc coating tests described by ANSI C80.1
2. Flexible conduit shall pass the tension, flexibility, impact, and zinc coating test described by UL 1
3. Nonmetallic conduit and fittings shall pass the test requirements of NEMA TC2, UL 651 and 651A and Federal Specification W-C-1094A

PART 2. PRODUCTS

2.01 RACEWAYS

A. Acceptable manufacturer’s

1. Cantex
2. Wheatland Tube
3. ABB - Ocal
4. Champion Fiberglass
5. NEC Inc., - Black Guard
6. Atkore - CALBOND
7. Atkore - Heritage Plastics
8. Allied Tube & Conduit

9. Prime Conduit
10. Emerson - O-Z/Gedney
11. Eaton/Crouse-Hinds
12. Western Tube and Conduit
13. Robroy – Plasti-Bond
14. Or equal

B. Materials and equipment

1. Design Conditions. Use electrical conduit, fittings, and bodies designed for service in areas as specified within this section to form a continuous support system for power, control, and instrument cables
   a. Use PVC coated steel conduits and hardware for Wastewater Facilities or corrosive environments
   b. Use rigid galvanized steel conduits for Water Facilities
2. Conduit and Fittings
   a. Fiberglass Conduit – Above Ground
      i. Listing: UL 2515 Above Ground Standard
      ii. RTRC (Thermosetting Resin Conduit) manufactured by single circuit filament winding process. The resin shall be epoxy based, with no fillers.
      iii. Manufacturer shall have a current ISO 9001 Quality Management System Certificate
      iv. Toxicity: The conduit shall not contain any compounds that can release halogens (chlorine, bromine, flour, and iodine) in more than trace amounts when burning.
   b. Fiber Glass conduit – XW Conduit
      i. RTRC (Thermosetting Resin Conduit) manufactured by single circuit filament winding process. The resin shall be epoxy based, with no fillers.
      ii. Manufacturer shall have a current ISO 9001 Quality Management System Certificate
      iii. Toxicity: The conduit shall not contain any compounds that can release halogens (chlorine, bromine, flour, and iodine) in more than trace amounts when burning.
      iv. Wall thickness: Minimum of .25”
   c. Rigid Steel Conduit and Fittings:
      i. Rigid steel conduit, rigid steel conduit bends, nipples, and bodies shall be hot-dipped galvanized and shall comply with the latest ANSI C80.1, UL 6, Federal Specification WW-C-581E, and NEC Article 344

ii. Mild steel tubing shall be used for conduit, nipples, and couplings, and shall be free of defects on both the inner and outer surfaces

iii. Fittings, bodies, and covers for rigid steel conduit shall be steel or cast-iron and shall comply with ANSI C80.4, UL 514B, and Federal Specification W-C-58C

d. PVC-Coated Rigid Steel Conduit and Fittings.

i. PVC-coated conduit, fittings, bodies, and covers shall conform to NEMA RN1 (Type A). Rigid steel galvanized conduit and fittings before coating shall conform to Federal Specification WW-C-581E, ANSI C80.1, and UL 6. Conduit bodies shall conform to UL 514B and Federal Specification W-C-58C. Provide sufficient coating for touch up after installation

ii. PVC-coated couplings shall be of the ribbed type

iii. Condulet covers shall have encapsulated stainless steel thumbscrews

iv. Condulets and covers shall be of malleable iron or feraloy material before coating

v. PVC coating shall be a minimum of 2-mil thickness on the interior of the conduit and the interior of fittings, condulets, covers, and bodies

vi. Conduit clamps, strut, and devices shall be PVC coated when used with PVC-coated conduit

e. Flexible and Liquid tight Flexible Metal Conduit and Fittings

i. Use liquid tight flexible metal conduit manufactured in accordance with UL 1 and Federal Specification WW-C-566C

ii. Fittings used with liquid tight flexible metal conduit shall be the PVC- coated type and of such design as to thoroughly ground the conduit to the fittings and through it to the box or enclosure to which it is attached

iii. Liquid tight flexible couplings and fittings for use in hazardous areas shall comply with UL 886, NEC Article 501-10 (A&B), and Federal Specification W-C-586C

iv. Do not use flexible metal conduit or liquid tight flexible metal conduit for light fixtures or receptacles unless shown on plans or approved by Engineer

f. PVC Conduit and Fittings. Use PVC conduit, bends, and fittings, which comply with NEMA TC2, W-C-1094A, and NEC Article 352-III for above ground and underground installation. Conduit shall be Schedule 80, unless shown or noted otherwise on drawings or in other specifications

g. Use PVC Schedule 80 conduits, fittings, and boxes for all chemical areas and provide conduit seals per NEC

h. Aluminum RMC conduit may be used only where shown on plans

i. Do not use liquid tight flexible metallic conduit to connect rigid conduit to fixed or wall mounted enclosures or panels

j. Do not run liquid tight flexible metallic conduit directly thru walls, ceilings, or floors.

k. Do not attach liquid tight flexible metallic conduit with nylon or plastic tie- wraps on straps. Use aluminum straps made for that purpose, except where approved by Engineer.

C. Use UNY or UNF aluminum unions

D. Conduit entrances into equipment shall be carefully planned. Cutting away of enclosure structure, torching out sill or braces, and removal of enclosure structural members, will not be acceptable

E. Below-grade to above-grade upturns in non-metallic runs shall be made with ETL-PVC-001 compliant PVC coated rigid metallic conduit including 90-degree bends

F. Above ground conduit shall be pvc coated rigid galvanized steel 1 in. minimum and shall comply with Article 346 of NEC and U.L. standard UL-6.

G. Below grade conduit shall be non-metallic rigid PVC Schedule 80 1 in. minimum, rated 90 degrees Celsius and conform to NEMA TC-2 and UL-651 Standards, transitions to above ground to be made with PVC coated hot dipped rigid steel conduit that is ETL-PVC-001 compliant.

H. Limited use of flexible conduit may be allowed if approved by the inspector. Use type LFNC flexible seal tight for 3/4 in. minimum thru 2 in. sizes, connectors shall be UL listed. Use aluminum core liquid tight flexible metal conduit for sizes 2 1/2 in. and larger, connectors shall be aluminum. All conduit shall be mounted on strut

2.02 CONDUIT FITTINGS

A. Field applied hubs for all enclosure type entries shall be aluminum with grounding type lock ring, nylon throat, threaded NPT insert and shall be MYERS "SCRU-TITE", or equal

B. Rigid metallic conduit chase nipples, slip fittings, unions, reducers shall be aluminum

C. Limited use of flexible conduit may be allowed if approved by the inspector. Use type LFNC flexible seal tight for 3/4 in. minimum thru 2 in. sizes, connectors shall be UL listed. Use aluminum core liquid tight flexible metal conduit for sizes 2 1/2 in. and larger, connectors shall be aluminum. All conduit shall be mounted on strut

2.03 BODIES AND BOXES

A. Conduit bodies such as "C", "LB", "T" and the like pulling fittings shall be sand-cast copper free steel. Covers shall be gasketed 316 stainless steel cover screws and clamp style attachment. Furnish Crouse-Hinds Form 7, or equal

B. Cast metal outlet boxes, pull boxes, and junction boxes whose volume is smaller than 100 cubic inches, and cast metal device boxes, shall be sand-cast copper free. All boxes shall have threaded hubs. Furnish Crouse-Hinds "FD" style Condulets, Appleton "FD" style Unilets, or equal

C. Covers for cast aluminum boxes shall be gasketed aluminum covers with 316 stainless steel screws. Furnish Pass & Seymor series WIUCast for receptacle covers and Cantex single gang toggle switch covers for light switches

PART 3. EXECUTION

3.01 PREPERATION

A. Package conduit in 10-foot bundles maximum with conduit and coupling thread protectors suitable for indoor and outdoor storage. Package fittings in manufacturer's standard quantities and packaging suitable for indoor storage. Package plastic-coated rigid conduit, fittings, and bodies in such a manner as to protect the coating from damage during shipment and storage

B. Store conduit above ground on racks to prevent corrosion and entrance of debris

C. Protect plastic conduit from sunlight

D. Confirm submittal of shop drawing with conduit and conduit fitting, sizes, types, and routing shown

E. Ensure that the conduit system to be installed is sized properly for the cable and wire requirements

F. Verify the actual physical conduit route from the conduit plan drawings and prepare the conduit support system

G. Verify the equipment locations to which the conduit will be connected and determine detail requirements for connections.

H. Submit layout of all conduit stub-ups for Engineers review before installing conduits. Do not install conduit to equipment, electrical panels or devices until enclosure locations and sizes have been determined and verified by Supplier.

3.02 INSTALLATION

A. Conduit bodies such as "LB", "T", etc., shall be installed in exposed runs of conduit wherever indicated and where required to overcome obstructions and to provide pulling access to wiring. Covers for such fittings shall be accessible and unobstructed by the adjacent construction. All conduit fittings shall be form 7 sand cast aluminum with aluminum covers and 316 S.S. hardware

B. Covers for conduit bodies installed shall match the conduit material being installed

C. No more than 270 degrees of bends shall be used in conduit runs

D. Empty conduits shall have pull-tape installed. Identify each terminus as to location of other end. Use blank plastic waterproof write-on label and write information on each label with waterproof ink. Cap exposed ends of empty conduit with threaded plastic caps

E. Conduit runs into boxes, cabinets, and enclosures shall be set in a neat manner. Vertical runs shall be set plumb. Conduits set cocked or out of plumb will not be acceptable. Use aluminum grounding type myers hubs with insulated throats for all enclosure entries

F. All raceways shall be swabbed clean after installation. There shall be no debris left inside. All interior surfaces shall be smooth and free from burrs and defects that would injure wire insulation. All conduits shall be sealed after cable installation with electrical insulation putty

G. Each flex connector shall be made-up tightly so that the minimum pull-out resistance is at least 150 lbs.

H. Rigid metallic conduit runs shall have their couplings and connections made with screwed fittings and shall be made up wrench tight. Check all threaded conduit joints prior to wire pull

I. All conduit runs shall be watertight over their lengths of run except where drain fittings are indicated. In which cases, install specified breather-drain fittings. Use aluminum seal-off fittings where required by NEC. Seal with 3M-2123 re-enterable sealing compound

J. LFNC conduit shall be used to connect wiring to limit switches, bearing thermostats, and other devices that may have to be removed for servicing. Unless otherwise indicated, maximum lengths of flex shall be six (6') feet

K. Install the conduit system to provide the facility with the utmost degree of reliability and maintenance free operation. The conduit system shall have the appearance of having been installed by competent workmen. Kinked conduit, conduit inadequately supported or carelessly installed, do not give such reliability and maintenance free operation and will not be accepted

L. Raceways shall be installed for all wiring runs

M. Conduit sizes, where not indicated, shall be N.E.C. code-sized to accommodate the number and diameter of wires to be pulled into the conduit. 3/4" trade-size shall be minimum size conduit except for conduits installed in duct banks which shall be a minimum 1” trade-size

N. Unless otherwise noted, conduit runs shall be installed exposed. Such runs shall be made parallel to the lines of the structure. Aluminum rigid conduit shall not come in contact with concrete

O. All raceway systems shall be adequately and safely supported. Loose, sloppy and inadequately supported raceways will not be acceptable. Supports shall be installed at intervals not greater than those set forth under Article 300 of N.E.C., unless shorter intervals are otherwise indicated, or unless conditions require shorter intervals of supports

P. Surface mounted runs of conduit on concrete or masonry surfaces shall be supported off the surface by means of 316 stainless steel slotted channels and conduit clamps. Attach each slotted channel support to concrete surface by means of two (2) 1/4" diameter 316 stainless steel bolts into drilled expansion shields

Q. Conduit runs that are installed along metallic structures shall be supported by means of 316 S.S. beam clamps or other methods as may be indicated

R. Below-grade conduits shall be supported with plastic saddles

S. Install PVC-coated conduits in all locations at wastewater facilities, inside valve vaults, in wet well slabs, in corrosive and wet environments, in chemical rooms (Schedule 80 required) and, where specifically noted on drawings. Aluminum PVC- coated conduit may be used where specifically shown on plans, where specifically noted in specifications or where approved in writing. Install PVC coated conduits in Water Facilities where wet locations, inside valve vaults, or where specifically shown on Plans or noted in other Specifications

T. Install rigid galvanized steel (RGS) conduits in dry inside locations and in all outdoor locations for water facilities and, where specifically noted otherwise on drawings. Aluminum RMC may be used where specifically shown on plans, where specifically noted in specifications or where approved in writing. Where aluminum conduit is approved, use all aluminum condulets and fittings

U. Install PVC conduits in duct banks. For stub-ups and directional turn elbows, use PVC-coated rigid steel elbows or rigid steel elbows as applicable in A and B above and other specifically noted locations on drawings. Rigid steel stub-up shall have minimum three (3) layers of mylar tape up to 1" above slab where conduit is in contact with concrete. Stub-ups inside MCC's, panels, equipment and/or enclosures shall have threads with grounding bushings installed. Stub up all conduits entering MCC's, and other equipment enclosures from the bottom into each respective starter, feeder breaker or control section per equipment manufacturers conduit layout detail. Coordinate with equipment manufacture data sheets before starting any underground or below slab conduit installations

V. Run exposed conduit parallel or perpendicular to walls, ceilings, or main structural members. Group multiple conduits together where possible. Do not install conduit where it interferes with the use of passageways, doorways, overhead cranes, monorails, equipment removal areas or working areas. In no case shall conduit routing present a safety hazard or interfere with normal plant operating and maintenance procedures. Maintain a minimum overhead clearance of 8'0" in passageways. Except where absolutely impossible, all conduits are to be installed in or under concrete slab, in walls and ceilings. Any exposed conduit installed otherwise may be relocated at Contractor's expense where directed by Engineer or Owner. Exceptions, where specifically noted otherwise on plans

W. Installation and support of conduit shall be from steel or concrete structures in accordance with the standard detail drawings. Furnish necessary conduit straps, clamps, fittings and support for the conduit in accordance with the standard details and consistent with the grade and type of conduit being installed

X. Identify conduit at termination points like MCC, light fixtures, control panels, receptacles, and junction boxes. Tag all conduits per Section 16052 – "Electrical Identification."

Y. Not more than three (3) equivalent 90-degree bends will be permitted between pull boxes, or between pull boxes and equipment. Provide bonded expansion fittings at building expansion joints. Where pull boxes are located such the three 90-degree

bend rule is not exceeded without the pull box, the box may be deleted where approved by Engineer in writing

Z. Install conduit runs so that they are mechanically secure, mechanically protected from physical harm, electrically continuous, and neat in appearance. The interiors of conduit shall provide clean, smooth raceways through which conductors may be drawn without damage to the insulation. Make threaded connections wrench tight

AA. Cut conduit square with a power saw or a rotary type conduit cutter designed to leave a flat face. Do not use plumbing pipe cutters for cutting conduit. Ream the cut ends of conduit with a reamer, designed for the purpose to eliminate rough edges and burrs. Cut threads with standard conduit dies providing 3/4-inch taper per foot, allowing the proper length so that joints and terminals may be made up tight and the ends of the conduit not deformed. Keep dies sharp and use a good quality threading oil continuously during the threading operation. Remove metal cuttings and oil from the conduit ends after the threads are cut and paint threads before connections are made. Use zinc rich, brush-on compound on the threads of steel conduit before connections are made. Use only tools specifically made for bending and installing PVC-coated or PVC conduit when installing these materials

BB. Use strap wrenches only to tighten joints in plastic coated rigid steel conduit. Replace all conduit and fittings with damage to the plastic coating, such as cuts, nicks and threader chuck jaw marks

CC. Make up changes in direction of exposed conduit using elbows or fittings. Do not use pull boxes to make direction changes unless specifically designated otherwise. Do not use elbow bends for change in direction of exposed conduit

DD. Field fabricated bends shall be free of indentations or elliptical sections. The radius of the bend shall not be less than 6 times the smallest diameter of the raceway

EE. Protect all conduit terminations from mechanical injury. Prevent the entry of moisture and foreign matter into the conduit system by properly capping terminations

FF. Avoid trapped runs of conduit, if possible. When they are necessary, provide drainage using a “tee” condulet equipped with a drain. Conduit is likely to pass through areas with a temperature differential of 20 degrees F or more. Seal penetrations with a proper seal fitting at the wall or barrier between such areas. For conduit passing through walls separating pressurized areas from non-pressurized areas, install sealing fittings at the wall on the non-pressurized side

GG. Fit conduit crossing building or structure expansion joints with approved expansion fittings, except that fittings will not be required when conduit crossing an expansion joint is supported on trapeze hangers in such a way that at no time will the conduit be under stress due to expansion. Install bonding jumpers around expansion joint fittings

HH. Where conduit terminates in sheet metal enclosures, threaded hubs are required. Conduit entries with double locknuts and bushings are prohibited. Sheet metal enclosures located outside or in any other wet, damp, or corrosive areas shall be furnished with threaded hubs. Restrict side penetrations to the lower one third of the enclosure

II. Provide liquid tight flexible metallic conduit only where necessary to allow for movement or to localize sound or vibration, at transformers, at motors, solenoid valves, motor operated valves, generators, and any other rotating equipment unless shown otherwise on Drawings. Do not make rigid connections of conduit to vibrating equipment housing or frame. Limit length to less than 2 feet. Do not use flexible metallic conduit for light fixture circuits or similar devices and do not use as a substitute for rigid conduit

JJ. Seal openings or holes where conduits pass through walls or floors. When conduits are passing through a firewall or fire-rated floor into different rooms, cabinets, or enclosures, use a fire-rated seal as shown in the typical detail included in the drawings. Certain walls, where indicated on the Drawings, require environmental (airtight) seals; seal as shown

KK. Install explosion-proof seals in conduit runs crossing or entering a hazardous classified area, where shown on Drawings. Install type CSBE removable sealing fittings to seal pump cables in the wet well and at the first junction box outside the well. Install EYS seals in all conduits leaving chemical rooms or chemical storage spaces. There shall be no unions, couplings, boxes, or fittings in conduit run between seal and point at which conduit leaves the room

LL. Unless otherwise indicated on the Drawings, install expansion fittings every 300 feet within a straight conduit run and where conduit crosses building expansion joints, using bonding straps to ensure ground continuity

MM. Parallel runs of conduit may be supported by structural steel racks. When two or more racks are arranged one above the other, provide vertical separation of not less than 12 inches between racks, unless otherwise indicated on the Drawings. Space conduits on the racks at least enough to provide 1/4-inch clearance between hubs on adjacent conduits at terminations and to allow room for fittings

NN. Fill conduit racks no more than 75 percent of their capacity, providing usable space for future conduit. To ensure this, conduits leaving the rack horizontally shall be offset up or down so that future conduits may be installed in the space remaining. Construct conduit racks to permit access for wire or cable pulling at all pull points, even when future conduits are added to fill the racks

OO. Where conduit racks are supported on rods from beam clamps or by some other non- rigid suspension system, install rigid supports at no more than 50-foot intervals to give lateral stability to the rack

PP. Conduit racks or hangers must in no way interfere with machinery (or its operation), piping, structural members, process equipment, or access to anticipated future equipment. Refer to architectural, structural, equipment layout and piping drawings to ensure that this requirement is met

QQ. Label high voltage conduit with the circuit phase-to-phase voltage by means of a firmly attached tag or label of approved design at each conduit termination, on each side of walls or barriers pierced and at intervals not exceeding 200 feet along the entire length of the conduit

RR. Support conduit sizes 2 inches and larger at spacings not exceeding 10 feet and conduit sizes 1-1/2 inches and smaller at spacings not exceeding 8 feet

SS. The means of fastening conduit to supports shall be by one-hole malleable iron conduit straps secured by wood screws to wood and by bolts with expansion anchors to concrete or masonry; by “Korn” clamps or U-bolts to other surfaces. Use “clamp backs” when strapping conduits to walls, column faces, or other such surfaces

TT. Support conduit runs with conduit clamps, hangers, straps, and metal framing channel attached to structural steel members. Conduits of 1-1/2-inch size or less may be supported by one-hole conduit straps on concrete, tile or steel work, but for larger size conduit, use 2-hole straps. Use clamps of galvanized malleable iron for rigid galvanized conduit and PVC-coated or stainless steel for PVC-coated conduit. Metal framing channel straps used for PVC-coated conduit shall be Type 316 stainless steel

UU. Install conduits supported from building walls with at least 1/4-inch clearance from the wall to prevent the accumulation of dirt and moisture behind conduit. All conduits shall be routed below concrete floor slabs on grade and shall have sand fill and cover. Set depth to account for radius of turn-up to prevent exposure of elbow bend

VV. Where specifically shown on plans, size and space embedded conduits in structural slabs in accordance with the Uniform Building Code. Conduits should occupy no more than one-third the thickness of the slab and should not be closer than 3 times the largest diameter on center without additional reinforcement

WW. Do not cut paved driveways, sidewalks, concrete foundations, etc. to install conduits unless specifically noted on plans. Bore under such construction and maintain a minimum of 24 inches below underside of paving or concrete. Repair any cutting or damage to original condition and to satisfaction of Engineer and Owner

XX. All conduits for fiber optic cables are to have wide tube radius compatible with cable manufacturer’s requirements

YY. Damaged conduits shall be replaced at no additional cost to Owner where Engineer deems necessary because of extent of damage or, where conductors are damaged by defective conduit installation

ZZ. Seal all conduits entering motor control centers, control panels, equipment, enclosures, valve actuators, etc. with CSBE seals or, install EYS at locations permissible. Sealing glands shall be selected specifically for each conduit and conductor. Install seals at all equipment located at elevation lower than U.G. conduit route

AAA. Conduits penetrating underground pull boxes shall be sealed with CSBE seals where larger than 1 ¼-inch diameter and with RTV silicon-based sealant where smaller than 1 ¼-inch diameter

BBB. Conduits penetrating structural walls of lower levels shall be sealed with CSBE seals where larger than 1 ¼-inch diameter and with RTV silicon-based sealant where smaller than 1 ¼-inch diameter

CCC. All conduit duct banks penetrating lower level structures and penetrating underground pull boxes shall be sealed watertight between conduit and wall of structure or pull box

DDD. Where conduits are stubbed out from building for future use, extend conduits 5 feet past building wall or past edge of pavement, whichever is applicable. Do not leave under pavement. Cap ends of conduits

EEE. All conduits shown entering outside walls of buildings shall stub-up immediately adjacent to wall and penetrate low on wall. Where not shown entering wall, all conduits shall be routed up through building floor by excavating below foundation, core drill through floor, and stub-up conduits then backfill with cement stabilized sand, compacted in place

FFF. Apply a conductive coating to field-cut threads of aluminum conduits to ensure continuity and ease of joining. Noalox and Kopr-Shield are acceptable coatings

GGG. Avoid excessive force when tightening threaded fittings for aluminum conduit, both between conduits and at threaded box entries. Generally, the correct force is hand-tight plus one full turn with a wrench. At least three (3) full threads should be engaged

HHH. Do not use conduit bushings to secure threaded aluminum RMC to a box or enclosure. Install a locknut between a conduit bushing and the inside of the box or enclosure

III. Threadless fittings shall not be used with threaded aluminum conduit

JJJ. Install expansion fittings in outdoor runs of aluminum RMC

KKK. Do not install aluminum conduit in concrete or underground

LLL. Use special tools for installing aluminum conduit. All damaged conduits shall be replaced

MMM. In chemical rooms, enclosures, and portable/prefab buildings used for chemical storage or chemical equipment operation, use Schedule 80 PVC conduit and fittings only, except where specifically noted on Plans, use PVC coated steel conduit. Use PVC boxes and enclosures. There are no exceptions to this requirement unless specifically noted on drawings as an exception to this section

NNN. Do not route conduit on outside walls of buildings or structures unless specifically shown on Plans, route from floor slab. Do not route conduit on building interiors, MCC rooms or equipment rooms unless shown on Plans, or approved in writing. Exception: conduits to light fixtures on ceilings. Paint to match. Where shown on Plans or where approved, conduits shall be painted to match surface on which installed. Submit drawings or sketches of any conduit routing that varies from Plans or Specifications.

OOO. Where underground conduit ductbanks are routed under new building slabs greater than 4 inches thick, conduits may be encased in cement stabilized sand with red marking tape

PPP. Provide steel conduit for all security, fire, TV, and access control system circuits. Coordinate circuits and conduit requirements within respective vendors

QQQ. Paint all exposed conduit threads to prevent corrosion. Match color of conduit

RRR. Paint all exposed rigid steel surface mounted conduits in MCC rooms. Match wall and ceiling color

SSS. Where RGS conduit is installed on interior or exterior building walls (or ceilings), paint conduit, supports and clamps to match wall color

TTT. Contact Engineer for inspection of conduit stub-ups and U.G. ductbanks before concrete pour

UUU. Where RGS conduit is installed on interior or exterior building walls (or ceilings), paint conduit, supports and clamps to match wall color

VVV. For conduits that will contain coaxial cable or other wide radius band cables, provide wide sweep conduit elbows on bands that will accommodate pulling such cables thru 3 90 degree turns without exceeding band radius limitations.

END OF SECTION

Section 16133

Underground Ductbank

PART 1. GENERAL

1.01 SUMMARY

A. This specification is confidentially issued for this specific project only.

B. Contractor shall be responsible for reading all specifications from all disciplines prior to bid.

1.02 REFERENCES

A. National Fire Protection Association (NFPA): No. 70 - National Electrical Code (NEC) Appendix B

1.03 SUBMITTALS, RECORD DRAWINGS, AND O&M MANUALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

PART 2. PRODUCTS

2.01 ACCEPTABLE MANUFACTURER'S

A. Thomas and Betts

B. Underground Devices Inc.

C. Walker Division, Butler Manufacturing Company.

D. Carlon

E. Or approved equal

2.02 MATERIALS AND EQUPMENT

A. Conduit: Construct ducts using schedule 80 rigid PVC conduit

B. Spacers: Secure conduit with non-magnetic, universal, interlocking-type spacers for both horizontal and vertical duct arrangements

C. Concrete: Use steel reinforced, red concrete as duct encasement. Provide Class F concrete in non-truck traffic areas. Provide Class C concrete under gravel or asphalt driveways subject to heavy traffic

D. Where unprotected service conductors are routed through a pull box with other conductors a divider wall shall be provided in the pull box for separation as required by the NEC

PART 3. EXECUTION

3.01 PREPERATION

A. Have duct spacers and associated hardware packed and crated to avoid damage during shipment and handling

B. Clearly mark packages or crates stating that the material is for electrical duct banks only

C. Verify from Drawings and field survey that the location of ductbanks does not interfere with any existing or new underground facilities

D. Verify that materials are on site in proper condition and that sufficient quantity is on hand for the work

E. Verify that trenches are in the correct places and prepared with sufficient depth and width to accommodate the duct banks, reinforcing rod, and concrete

F. Be prepared for inspection of the duct banks before reinforcing rod is installed

G. Before pouring concrete, verify that the ducts are free of debris and properly installed in the support and spacer systems and that the ducts are properly fitted together and firmly held in place by the hold down hardware

H. Provide 24-hour notice to Engineer and the Local Code Inspector for cover-up inspection before pouring electrical conduit ductbanks

3.02 INSTALLATION

A. Conduit runs installed below-grade in earth shall be Sch 80 PVC. Use manufacturer's approved cement for joining couplings and adapters. Runs shall be installed so that top of concrete ductbank is a MINIMUM OF TWENTYFOUR (24") INCHES BELOW FINISHED GRADE. Support conduit runs on plastic spacers and encase conduits with 3000 PSI reinforced concrete dyed with red concrete dye at a rate of 12 pounds of dye per cubic yard of concrete. Provide clearances as shown on detail drawings. Cover top of concrete to finished grade with selected soil that is free from clods, debris, rocks and the like. Pneumatically tamp backfill in six (6") inches to eight (8") inches below finished grade, install continuous run of "BURIED ELECTRIC" marking tape and complete backfill to finished grade. Contractor’s means and methods shall prevent floating of conduit and rebar during concrete placement. Metal to metal contact between the earth and rebar cage is not allowed

3.03 EXCAVATION AND BACKFILLING

A. Do all excavating and backfilling necessary for the installation of the work. This shall include shoring and pumping in ditches to keep them dry until the work in question has been installed. All shoring required to protect the excavation and safeguard employees shall be properly performed

B. All excavations shall be made to the proper depth, with allowances made for floors, forms, beams, piping, finished grades, etc. Ground under conduits shall be well compacted before conduits are installed

C. All backfilling shall be made with selected soil; free of rock and debris and shall be pneumatically tamped in six (6") inch layers to secure a field density ratio of 90%

D. All excavated material not suitable and not used in the backfill shall be removed offsite at the Contractors expense

E. Field check and verify the locations of all underground utilities prior to any excavating. Avoid disturbing these as far as possible. In the event existing utilities are broken into or damaged, they shall be repaired so as to make their operation equal to that before the trenching was started at no additional cost to owner

F. Where the excavation requires the opening of existing walks, drives, or other existing pavement, these facilities shall be cut as required to install new lines and to make connections to existing lines. The sizes of the cut shall be held to a minimum consistent with the work to be installed. After installation of new work is completed and the excavation has been backfilled in accordance with above, repair existing walks, drives or other existing pavement to match existing installation

G. Use the size and types of conduit as indicated on the Drawings for the various duct banks required for the project

H. Make duct bank installations and penetrations through foundation walls watertight

I. Assemble ductbanks using non-magnetic saddles, spacers, and separators. Position separators to provide 3-inch minimum concrete separation between the outer surfaces of the conduits

J. Provide a 3-inch minimum concrete covering on both sides, top and bottom of concrete envelopes around conduits. Add red dye at the rate of 10 pounds per cubic yard to concrete used for envelopes for easy identification during subsequent excavation

K. Firmly fix ducts in place during pouring of concrete. Carefully spade and vibrate the concrete to ensure filling of spaces between ducts

L. Make bends with sweeps of radius not less than 6 times the smallest diameter of the raceway

M. Make a transition from non-metallic to metallic rigid conduit where duct banks enter structures or turn upward for continuation above grade

N. Make bends of 30 degrees or more using rigid galvanized steel

O. Reinforce duct banks throughout, where indicated on the Drawings

1. Unless otherwise noted on the Drawings, reinforce with No. 5 longitudinal steel bars placed at each corner and along each face at a maximum parallel spacing of 12 inches on centers, and No. 5 tie-bars transversely placed at 18-inch maximum longitudinal intervals

2. Maintain a maximum clearance of 3 inches from bars to the edge of the concrete encasement

P. Where ducts enter structures such as handholes, manholes, pull boxes, or buildings, terminate the ducts in suitable end bells, insulated L-bushings, Myers hubs or

couplings on steel conduits. Tag conduit entering pull boxes with stamped, stainless steel tags. Identify as designated in cable and conduit schedule

Q. Do not backfill with material containing large rock, paving materials, cinders, large or sharply angular substances, corrosive material, or other materials that can damage or contribute to corrosion of ducts or prevent adequate compaction of fill

R. Install a bare stranded copper duct bank ground on top of duct bank. Make ground electrically continuous throughout the entire duct bank system. Connect ground to switchgear and MCC ground buses and to steel conduit extensions of the underground duct system

S. After completion of the duct bank and prior to pulling cable, pull a mandrel, not less than 12 inches long and with a cross section approximately one-fourth inch less than the inside cross section of the duct, through each duct. Then pull a rag swab or sponge through to remove any particles of earth, sand or gravel that may have been left in the duct. Re-pull the rag or sponge swab until the swab emerges clean

T. Use hemp rope to pull conductors into PVC conduit. Do not use nylon or wire cable for this purpose

U. Install a warning ribbon approximately 12 inches below finished grade over underground duct banks.

V. For manholes and pull boxes below grade, install racks to support cables properly around the perimeter and keep them dry. Arrange cables in orderly fashion and tie to racks. If metallic racks are used, provide grounding per NEC

W. For manholes and pull boxes below grade, construct a french drain, or other drainage as detailed on the Drawings

X. All manhole and U.G. pull boxes used for electrical construction are to have the work “Electrical” permanently embossed on cover

Y. Conduits penetrating underground pull boxes shall be sealed with CSBE seals where larger than 1 ¼-inch diameter and with RTV silicon-based sealant where smaller than 1 ½-inch diameter

Z. Conduits penetrating structural walls of lower levels shall be sealed with CSBE seals where larger than 1 ¼-inch diameter and with RTV silicon-based sealant where smaller than 1 ½-inch diameter

AA. All conduit duct banks penetrating lower level structures and penetrating underground pull boxes shall be sealed watertight between conduit and wall of structure or pull box

BB. Install identification tags on all conduits at manholes, pull boxes, and junction boxes

CC. Conduits shall be separated by means of manufactured interlocking “chairs” spaced at no more than 5 feet apart along the length of the ductbank. Spacing between conduits shall not be less than 3 inches

DD. Every effort shall be made to minimize the number of bends in all ductbank systems. Field bends shall be made using a “hot box” designed for the size of PVC used. Care shall be given to ductbank routing so that very large radius sweeping

turns are designed into the route as opposed to factory made 45° and 90° bends. When factory 90° bends are used, they shall be a minimum of 36-inch radius for 4 inch and 48-inch radius for 5 inches. Factory 90° bends used in ductbank construction shall be rigid metal conduit (ferrous) only. These factory-made bends shall be protected by corrosion tape such as 3M Scotchrap 50 or approved equal prior to the concrete pour

EE. The ductbank support “chairs” shall be spaced up from the bottom of the trench using cement brick to ensure that the proper amount of concrete is poured under the conduits. Sides of the trench may be used as the form if the width does not exceed 1 ½ times the recommended dimension of the ductbank (width.)

FF. The Electrician shall vacuum, swab, and install pull strings in every conduit of the completed ductbank. The pull string shall be permanently marked in 1-foot increments to aid in wire estimation on future projects. Use Greenlee #435 pull string or approved equal

GG. Route all electrical ductbanks and conduits below water lines. Maintain minimum of 24 inches between bottom of water line and top of ductbank

HH. Electrical ductbanks are not required below concrete floors of buildings or below process equipment slabs, at which locations conduits shall be encased in minimum 3 inches of stabilized sand. Where ductbanks are shown on plans to be routed under existing concrete slabs or pavements, install per plan details. Do not cut rebar in existing conduit except where approved by Engineer. Repair any cut or damaged rebar by welding back together after conduits are installed. Submit detail of intent for cutting or removal of existing concrete for ductbank installation to Engineer for approval

END OF SECTION

Section 16211

Electrical Utility Service

PART 1. GENERAL

1.01 SUMMARY

A. This specification is confidentially issued for this specific project only

B. Contractor shall be responsible for reading all specifications from all disciplines prior to bid

C. Electric Utility Charges: Electric Utility charges for extension of distribution system to point of service termination and meters will be paid by Owner, except where bid allowance is indicated, or where specifically noted otherwise on plans or in other specifications

D. Temporary service disconnects at existing installations shall be paid for by Contractor. Prompt connection or reconnection of service shall be coordinated by Contractor. All temporary disconnection and reconnection costs are to be paid for by Contractor

E. Determine the exact requirements for the utility service connections and metering facilities as set forth by the utilities that will serve the project, and pay for and perform all work as required by those utilities

1.02 PRICE AND PAYMENT PROCEDURES

A. The Contractor shall request and pay for the service installation as part of this Contract and maintain the electrical service until the facility is fully installed and accepted by the Engineer and Owner

B. Allowance may be shown on bid sheet. Where not shown, contractor shall include all costs required for new service or modification to existing service

1.03 REFERENCES

A. National Fire Protection Association (NFPA): NFPA No. 7093 National Electrical Code (NEC)

B. Installation shall strictly comply with current Power Company standards. Where plans conflict with Power Company standards, contact Engineer for directions before starting work. Failure to do so is at Contractor’s risk

1.04 ADMINISTRATIVE REQUIREMENTS

A. The Contractor shall be required to transfer ownership of the electric service to the Owner. Documentation of the transfer of ownership shall be submitted to the Owner prior to Contract Closeout. Final payment will not be released until transfer of ownership documents have been submitted to the Owner

PART 2. PRODUCTS

2.01 ELECTRIC SERVICE

A. Electric Service Characteristics:

1. As indicated on Drawings and provided by Electric Utility. Standard voltage is as follows:
   a. 480/277-volt, 3 phase, 4 wire
   b. 120/240-volt, 3 phase 4 wire
   c. 120/240-volt, single phase, 3 wire
   d. Or as shown otherwise
2. Where 480-volt delta service is specifically shown on plans, adjust electrical wiring and select all devices to accommodate that type service. Where 12,470-volt primary service is provided, select all devices to accommodate that type service
3. All 480/277-volt service 200 amps and under, where the service conductors' feeds through the meter shall have a disconnect switch installed upstream of the meter per Power Company standards. This requirement is essential and may be shown on plans. CT cans are required for service above 200 amp
4. Allow for aerial or underground service equipment in bid as determined by Power Company. Most stringent requirements shall be provided at no additional cost to Owner
5. Do not route aerial service drop across site. Contact Engineer if problem.

B. Service Pole Location: Locate service pole based on "Outlet Location Data Statement" and drawing from Power Company. Do not install service pole or service equipment without this data statement and without confirming location with Power Company and Engineer. Contact Engineer prior to construction. Provide submittal with layout of Power Company's pole, Owner's service pole or rack, control panel or MCC or control building for review by owner, Engineer and Power Company before starting construction. Send copy of Power Company "Outlet Location Data Statement" to Engineer for review. Any construction performed without Engineer's review is at Contractor's risk and expense

C. All bus weatherhead installations shall have approved insulated split closure plate around entering conductors from Power Company drop to prevent entry of birds or animals into bus weather head assembly. Install EYS seals in conduits from weather head above to equipment below.

D. Provide pad mounted transformer service equipment, conduits and devices where only U.G. or pad mounted transformer service is available from Power Company

PART 3. EXECUTION

3.01 PREPERATION

A. Confirmation of Electric Service:

1. Consult with Electric Utility to verify service information specified and shown on Drawings. Failure to do so may result in removal and replacement of service equipment at Contractor's cost. Do not start service installation work until "Outlet Location Data Statement" has been received from Power Company and has been reviewed and approved in writing by the Engineer

B. Include deviations required by Electric Utility from contract documents to comply with Electric Utility standards and requirements. Send drawing of final service arrangement for engineer's review. Do not install service equipment until approved by Power Company in writing

C. Relocate service pole, transformer pad or structure up to (10) ten feet to maintain clearance required by Electric Utility Company or to maintain other clearances. Coordinate exact point of service with Power Company and locate customer service pole within distance of Power Company pole as per Power Company Standards. Failure to coordinate location is at expense of Contractor and at no additional cost to Owner

D. Metering:

1. Consult with Electric Utility regarding service entrance requirements and metering equipment. Conform strictly to Utility Company standards
2. Install metering equipment and empty conduit for metering conductors to meet standards and requirements of Electric Utility
3. Consult with electric utility regarding arrangement of disconnect switch in relation to meter, meter can, or other service equipment
4. Where 480 voltmeters is used and a manual transfer switch is used, install one (1) disconnect switch above meter and one (1) below meter per Power Company requirements

E. Application for Electric Service.

1. Obtain required forms from Electric Utility.
2. Assist Owner in completion of forms and deliver completed forms to Electric Utility. Advise Owner of exact voltage and phase requirements
3. Coordinate schedule for installation of electric service with Electric Utility.
4. Notify utility company in writing, within 30 days of project start date that permanent service will be required for this project. Specify date required and location of project
5. Notify Owner and Engineer, in writing of date service applied for, date to be installed, Power Company contact name and telephone number and copy of "Outlet Location Data" report as this information become available. Do not start construction of service without this report and without confirming service location with Engineer
6. Notify Power Company when old abandoned service is to be disconnected. Coordinate with Owner
7. Contractor is responsible to see that service is connected according to the Power Company standards. Final permanent service connection by Power

Company is required before project is considered complete, before final acceptance, and before final payment is made

END OF SECTION

Section 16212

Short Circuit Coordination Study – Arc Flash Hazard Analysis

PART 1. GENERAL

1.01 SUMMARY

A. This specification is confidentially issued for this specific project only

B. Contractor shall be responsible for reading all specifications from all disciplines prior to bid

C. The contractor shall furnish short-circuit and protective device coordination studies as prepared by the electrical equipment manufacturer or an approved engineering firm

D. The contractor shall furnish an Arc Flash Hazard Analysis Study per the requirements set forth in NFPA 70E – Standard for Electrical Safety in the Workplace. The arc flash hazard analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA70E-2004, Annex D

E. The scope of the studies shall include all new distribution equipment supplied by the equipment Manufacturer under this contract

1.02 REFERENCES

A. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

1. IEEE 141 – Recommended Practice for Electrical Power Distribution and Coordination of Industrial and Commercial Power Systems
2. IEEE 242 – Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
3. IEEE 399 – Recommended Practice for Industrial and Commercial Power System Analysis
4. IEEE 241 – Recommended Practice for Electric Power Systems in Commercial Buildings
5. IEEE 1015 – Recommended Practice for Applying Low-Voltage Circuit Breakers Used in Industrial and Commercial Power Systems
6. IEEE 1584 – Guide for Performing Arc-Flash Hazard Calculations

B. American National Standards Institute (ANSI):

1. ANSI C57.12.00 – Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
2. ANSI C37.13 – Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures

3. ANSI C37.010 – Standard Application Guide for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis
4. ANSI C37.41 – Standard Design Tests for High Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches and Accessories

C. The National Fire Protection Association (NFPA)

1. NFPA 70 – National Electrical Code, latest edition
2. NFPA 70E – Standard for Electrical Safety in the Workplace

1.03 SUBMITTALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

B. The short-circuit and protective device coordination studies shall be submitted to the design engineer prior to receiving final approval of the distribution equipment shop drawings and/or prior to release of equipment drawings for manufacturing. If formal completion of the studies may cause delay in equipment manufacturing, approval from the engineer may be obtained for preliminary submittal of sufficient study data to ensure that the selection of device and characteristics will be satisfactory

C. The results of the short-circuit, protective device coordination and arc flash hazard analysis studies shall be summarized in a final report. No more than five (5) bound copies of the complete final report shall be submitted. For large system studies, submittals requiring more than five (5) copies of the report will be provided without the section containing the computer printout of the short-circuit input and output data. Additional copies of the short-circuit input and output data, where required, shall be provided on CD in PDF format

D. The report shall include the following sections:

1. Executive Summary
2. Descriptions, purpose, basis and scope of the study
3. Tabulations of circuit breaker, fuse and other protective device ratings versus calculated short circuit duties
4. Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip unit settings, fuse selection
5. Fault current calculations including a definition of terms and guide for interpretation of the computer printout
6. Details of the incident energy and flash protection boundary calculations
7. Recommendations for system improvements, where needed
8. One-line diagram

E. Arc flash labels shall be provided in hard copy only at least 30 days prior to energizing the electrical equipment

PART 2. PRODUCTS

2.01 STUDIES

A. Contractor to furnish short-circuit and protective device coordination studies as prepared by equipment manufacturer or an approved engineering firm

B. The contractor shall furnish an Arc Flash Hazard Analysis Study per NFPA 70E – Standard for Electrical Safety in the Workplace, reference Article 130.3 and Annex D

2.02 COMPUTER ANALYSIS SOFTWARE

A. The studies shall be performed using the latest revision of the SKM Systems Analysis Power* Tools for Windows (PTW) software program

2.03 DATA COLLECTION

A. A Contractor shall furnish all data as required by the power system studies. The Engineer performing the short-circuit, protective device coordination and arch flash hazard analysis studies shall furnish the Contractor with a listing of required data immediately after award of the contract. The Contractor shall expedite collection of the data to assure completion of the studies as required for final approval of the distribution equipment shop drawings and/or prior to the release of the equipment for manufacturing.

B. Source combination may include present and future motors and generators

C. Load data utilized may include existing and proposed loads obtained from Contract Documents provided by Owner, or Contractor

D. If applicable, include fault contribution of existing motors in the study. The Contractor shall obtain required existing equipment data, if necessary, to satisfy the study requirements

2.04 SHORT-CIRCUIT AND PROTECTIVE DEVICE EVALUATION STUDY

A. Use actual conductor impedances if known. If unknown, use typical conductor impedances base on IEEE Standard 141-1993

B. Transformer design impedances shall be used when test impedances are not available

C. Provide the following:

1. Calculation methods and assumptions
2. Selected base per unit quantities
3. One-line diagram of the system being evaluated
4. Source impedance data, including electric utility system and motor fault contribution characteristics
5. Tabulations of calculated quantities
6. Results, conclusions and recommendations

D. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault at each:

1. Electric utility's supply termination point
2. Incoming switchgear
3. Unit substation primary and secondary terminals
4. Low voltage switchgear
5. Motor control centers
6. Standby generators and automatic transfer switches
7. Branch circuit panelboards
8. Other significant locations throughout the system

E. For grounded systems, provide a bolted line-to-ground fault current study for areas as defined for the three-phase bolted fault short-circuit study

F. Protective Device Evaluation:

1. Evaluate equipment and protective devices and compare to short circuit ratings
2. Adequacy of switchgear, motor control centers, and panelboard bus bars to withstand short-circuit stresses
3. Notify Owner in writing, of existing, circuit protective devices improperly rated for the calculated available fault current

2.05 PROTECTIVE DEVICE COORDINATION STUDY

A. Proposed protective device coordination time-current curves (TCC) shall be displayed on log-log scale graphs

B. Include on each TCC graph, a complete title and one-line diagram with legend identifying the specific portion of the system covered

C. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed

D. Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended

E. Plot the following characteristics on the TCC graphs, where applicable:

1. Electric utility's overcurrent protective device
2. Medium voltage equipment overcurrent relays
3. Medium and low voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands
4. Low voltage equipment circuit breaker trip devices, including manufacturer's tolerance bands
5. Transformer full-load current, magnetizing inrush current and ANSI through-fault protection curves
6. Conductor damage curves

7. Ground fault protective devices, as applicable
8. Pertinent motor starting characteristics and motor damage points, where applicable
9. Pertinent generator short-circuit breaker in each motor control center and applicable panelboard

F. Provide adequate time margins between device characteristics such that selective operation is provided, while providing proper protection

2.06 ARC FLASH HAZARD ANALYSIS

A. The arc flash hazard analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA70E-2004, Annex D

B. The flash protection boundary and the incident energy shall be calculated at all significant locations in the electrical distribution system (switchboards, switchgear, motor-control centers, panelboards, busway and splitters) where work could be performed on energized parts

C. The Arc-Flash Hazard Analysis shall include all significant locations in 240 volt and 208 volt systems fed from transformers equal to or greater than 125 kVA where work could be performed on energized parts

D. Safe working distances shall be based upon the calculated arc flash boundary considering an incident energy o 1.2 cal/cm²

E. When appropriate, the short circuit calculations and the clearing times of the phase overcurrent devices will be retrieved from the short-circuit and coordination study model. Ground overcurrent relays should not be taken into consideration when determining the clearing item when performing incident energy calculations

F. The short-circuit calculations and the corresponding incident energy calculations for multiple system scenarios must be compared and the greatest incident energy must be uniquely reported for each equipment location. Calculations must be performed to represent the maximum and minimum contributions of fault current magnitude for all normal and emergency operating conditions. The minimum calculation will assume that the utility contribution is at a minimum and will assume a minimum motor contribution (all motors off). Conversely, the maximum calculation will assume a maximum contribution from the utility and will assume the maximum amount of motors to be operating. Calculations shall take into consideration the parallel operation of synchronous generators with the electric utility, where applicable

G. The incident energy calculation must consider the accumulation of energy over time when performing arc flash calculations on buses with multiple sources. Iterative calculations must take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors and generators should be decremented as follows:

1. Fault contribution from induction motors should not be considered beyond 3-5 cycles.

2. Fault contribution from synchronous motors and generators should be decayed to match the actual decrement of each as closely as possible (e.g. contributions from permanent magnet generators will typically decay from 10 per unit to 3 per unit after 10 cycles).

H. For each equipment location with a separately enclosed main device (where there is adequate separation between the lines side terminals of the main protective device and the work location), calculations for incident energy and flash protection boundary shall include both the line and load side of the main breaker

I. When performing incident energy calculation on the line side of a main breaker (as required per above), the line side and load side contributions must be included in the fault calculation

J. Mis-coordination should be checked amongst all devices within the branch containing the immediate protective device upstream of the calculation location and the calculation should utilize the fastest device to compute the incident energy for the corresponding location

K. Arc Flash calculations shall be based on actual overcurrent protective device clearing time. Maximum clearing time will be capped at 2 seconds based on IEEE 1584-2018 section B.1.2. Where it is not physically possible to move outside the flash protections boundary in less than 2 seconds during an arc flash event, a maximum clearing time based on the specific location shall be utilized

2.07 REPORT SECTIONS

A. Input data shall include, but not be limited to the following:

1. Feeder input data including feeder type (cable or bus), size, length, number per phase, conduit type (magnetic or non-magnetic) and conductor material (copper or aluminum)

2. Transformer input data, including winding connections, secondary neutral-ground connection, primary and secondary voltage ratings, kVA rating, impedance, % taps and phase shift

3. Reactor data, including voltage rating, and impedance

4. Generation contribution data, (synchronous generators and Utility), including short-circuit reactance (X'd), rated MVA, rated voltage, three-phase and single line-ground contribution (for Utility sources) and X/R ratio

5. Motor contribution data (inductin motors and synchronous motors), including short-circuit reactance, rated horsepower or kVA, rated voltage, and X/R ratio

B. Short-Circuit Output Data shall include, but not be limited to the following reports:

1. Low Voltage Fault Report shall include a section for three-phase and unbalanced fault calculations and shall show the following information for each applicable location:

a. Voltage

b. Calculated fault current magnitude and angle

c. Fault point X/R ratio

d. Equivalent impedance

2. Momentary Duty Report shall include a section for three-phase and unbalanced fault calculations and shall show the following information for each applicable location:
   a. Voltage
   b. Calculated symmetrical fault current magnitude and angle
   c. Fault point X/R ratio
   d. Calculated asymmetrical fault currents
      i. Based on fault point X/R ratio
      ii. Based on calculated symmetrical value multiplied by 1.6
      iii. Based on calculated symmetrical value multiplied by 2.7
   e. Equivalent impedance
3. Interrupting Duty Report shall include a section for three-phase and unbalanced built calculations and shall show the following information for each applicable location:
   a. Voltage
   b. Calculated symmetrical fault current magnitude and angle
   c. Fault point X/R ratio
   d. No AC Decrement (NACD) ratio
   e. Equivalent impedance
   f. Multiplying factors for 2, 3, 5 and 8 cycle circuit breakers rated on a symmetrical basis
   g. Multiplying factors for 2, 3, 5 and 8 cycle circuit breakers rated on a total basis

C. Recommended Protective Device Settings:
1. Phase and Ground Relays:
   a. Current transformer ratio
   b. Current setting
   c. Time setting
   d. Instantaneous setting
   e. Recommendations on improved relaying systems, if applicable
2. Circuit Breakers:
   a. Adjustable pickups and time delays (long time, short time, ground)
   b. Adjustable time-current characteristic
   c. Adjustable instantaneous pickup
   d. Recommendations on improved trip systems, if applicable

D. Incident energy and flash protection boundary calculations
1. Arcing fault magnitude

2. Protective device clearing item
3. Duration of arc
4. Arc flash boundary
5. Working distance
6. Incident energy
7. Hazard Risk Category
8. Recommendations for arc flash energy reduction

PART 3. EXECUTION

3.01 QUALIFIED ELECTRICAL CONTRACTORS

A. The short-circuit, protective device coordination and arc flash hazard analysis studies shall be conducted under the supervision and approval of a Registered Professional Electrical Engineer skilled in performing and interpreting the power system studies

B. The Registered Professional Electrical Engineer shall be a full-time employee of the equipment manufacturer or an approved engineering firm

C. The Registered Professional Electrical Engineer shall have a minimum of five (5) years of experience in performing power system studies

D. The equipment manufacturer or approved engineering firm shall demonstrate experience with Arc Flash Hazard Analysis by submitting names of at least ten actual arc flash hazard analysis it has performed in the past year

3.02 ARC FLASH WARNING LABELS

A. The contractor of the Arc Flash Hazard Analysis shall provide a 3.5 in. x 5 in. thermal transfer type label of high adhesion polyester for each work location analyzed

B. All labels will be based on recommended overcurrent device settings and will be provided after the results of the analysis have been presented to the owner and after any system changes, upgrades or modifications have been incorporated in the system

C. The label shall include the following information, at a minimum:

1. Location designation
2. Nominal voltage
3. Flash protection boundary
4. Hazard risk category
5. Incident energy

6. Working distance
7. Engineering report number, revision number and issue date

D. Labels shall be machine printed, with no field markings

E. Arc flash labels shall be provided in the following manner and all labels shall be based on recommended overcurrent device settings

1. For each 480 and applicable 208-volt panelboard, one arc flash label shall be provided
2. For each motor control center, one arc flash label shall be provided
3. For each low voltage switchboard, one arc flash label shall be provided
4. For each switchgear, one flash label shall be provided
5. For medium voltage switches one arc flash label shall be provided.

F. Labels shall be field installed by the engineering service division of the equipment manufacturer under the Startup and Acceptance Testing contract portion

G. Example of Arc Flash Warning Label:



3.03 ADJUSTEMENT/CALIBRATION

A. Adjust relay and protective device settings according to the recommended settings table provided by the coordination study. Field adjustments to be completed by the engineering service division of the equipment manufacturer under the Startup and Acceptance Testing contract portion

B. Make minor modifications to equipment as required to accomplish conformance with short circuit and protective device coordination studies

C. Notify Owner in writing of any required major equipment modifications

3.04 TRAINING

A. The contractor of the Arc Flash Hazard Analysis shall train the owner's qualified electrical personnel of the potential arc flash hazards associated with working on energized equipment (minimum 4 hours). The training shall be certified for continuing education units (CEU's) by the International Association for Continuing Education Training (IACET) or equivalent

END OF SECTION

Section 16230

Emergency Generator

PART 1. GENERAL

1.01 SUMMARY

A. This specification is confidentially issued for this specific project only

B. Contractor shall be responsible for reading all specifications from all disciplines prior to bid

C. A complete generating system and all related equipment, including cooling system, coolant pumps, expansion tanks, valves, piping lubricating systems, fuel system components, miscellaneous devices and all required appurtenances shall be built, tested, furnished, installed, and site tested by the generator Manufacturers Supplier and/or Local Representative. It is the Generator Suppliers responsibility that any and all electrical and mechanical parts of the complete generator system that Supplier sub-assigns for installation by another Contractor be accounted for, approved and coordinated by said Generator Supplier. Any additional electrical and/or mechanical equipment or devices required for the specific generating system for this project shall be accounted for in Supplier and Contractor's bid where or not shown in plan and specifications details for this project

D. Contractor shall contact local Factory Representative to verify all equipment purchased conforms to the requirements of this project. It is accepted that each manufacturer listed may have variation in certain specified parameters that are particular to each specific product, and this is to be accounted for in bid and in the data submitted for Engineer's review. Failure to do so may result in equipment removal and replacement at Contractor's expense

E. Coordinate generator circuit breaker and controls with transfer switch and switchgear supplier and provide interface circuits, equipment and devices as required for a complete operating system

F. Listing of acceptable Equipment Manufacturers does not limit or remove the intent of these specification requirements

G. Any and all exceptions to the published specifications shall be subject to the approval of the engineer

H. The power system shall be furnished by a single manufacturer who shall be responsible for the design, coordination, and testing of the complete system. The entire system shall be installed as shown on the plans, drawings, and specifications herein.

I. The equipment shall be produced by a manufacturer who has produced this type of equipment for a period of at least 10 years and who maintains a service organization available twenty-four hours a day throughout the year.

J. The equipment shall be supported by a local distributor who has had local facilities for at least 5 years and who maintains a local service organization available twenty-four hours a day throughout the year.

1.02 SCOPE OF WORK

A. The packaged, diesel engine-electric generating plant shall be pre-wired, pre-piped, assembled, and aligned on a single skid type base. The packaged system of new, unused equipment of the manufacturer's latest design includes all necessary instruments, devices, switches, and other appurtenances for proper operation of the unit: supplies steel safety guards around all external rotating parts, and provides a unit on which adjustments, repairs, and normal maintenance are possible without the use of special tools. The supplier of the package must have complete parts and service available on a 24-hour basis in the area of the job site. Parts stock must be maintained on engine/generator by the supplier of the package

B. It is the intent of this specification to secure a generator set system that has been tested during design verification, in production, and at the final job site. The generator set will be a commercial design and will be complete with all of the necessary accessories for complete installation as shown on the plans, drawings, and specifications herein. The equipment supplied shall meet the requirements of the National Electrical Code and applicable local codes and regulations.

C. All equipment shall be new and of current production by a national firm that manufactures the generator sets and controls and transfer switches, and assembles the generator sets as a complete and coordinated system. There will be one-source responsibility for warranty, parts, and service through a local representative with factory-trained servicemen.

1.03 REFERENCES

A. All material and equipment supplied under this specification shall be designed, assembled, tested, and conform in full compliance with the latest edition of the following codes and standards:

1. UL – Underwriters' Laboratories
2. NEMA - National Electronic Manufacturers Association
3. ASA - American Standards Association
4. ANSI - American National Standards Institute
5. CSA C22.2, No. 14-M91 Industrial Control Equipment.
6. EN50082-2, Electromagnetic Compatibility-Generic Immunity Requirements, Part 2: Industrial.
7. EN55011, Limits and Methods of Measurement of Radio Interference Characteristics of Industrial, Scientific and Medical Equipment.
8. IEC8528 part 4, Control Systems for Generator Sets.
9. IEC Std 61000-2 and 61000-3 for susceptibility, 61000-6 radiated and conducted electromagnetic emissions.

10. IEEE446 Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications.
11. NFPA 70, National Electrical Code, Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.
12. NFPA 99, Essential Electrical Systems for Health Care Facilities.
13. NFPA 110, Emergency and Standby Power Systems. The generator set shall meet all requirements for Level 1 systems. Level 1 prototype tests required by this standard shall have been performed on a complete and functional unit. Component level type tests will not substitute for this requirement.

B. The generator set shall be ETL certified to UL 2200 standards or submitted to an independent third-party certification process to verify compliance as installed.

C. Generator system shall comply with all EPA, state and local requirements. Where generator size shown on plans is not properly rated, the next size up shall be supplied

1.04 SUBMITTALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

B. Provide CAD files of diagrams, equipment views, and material & device schedules on CD and include with submittals. Only one (1) copy required for Electrical Engineer. Only electronic files will be reviewed. Hard copy submittals are not acceptable and will be returned as rejected.

C. Six (6) copies of the following items are required of the successful bidder prior to manufacture:

1. Certified dimensional drawings showing weight, outline dimensions, bolting and drilling details, clearances for installation, operation and maintenance, and required ventilation
2. Elevation views, showing and identifying all items furnished and section views as required to locate all components
3. Bill of material describing all components and recommended spare parts with pricing and delivery
4. Brochures on engine, generator, muffler, batteries, charger, control panel, and any accessory equipment showing ratings, construction features, and performance characteristics
5. Schematic and wiring diagrams of the electrical system showing all factory wiring and clearly indicating wiring and voltage of any electrical strip heaters. Also, submit fully detailed inter-connection drawings indicating each individual connection to any remote equipment, including a separate connection drawing to show point-to-point electrical wiring connections
6. Submit documentation showing compliance with EPA/TCEQ emission requirements via location and EPA “TIER” rating. Include the current EPA conformity documentation for engine supplied with submittal package for review

7. Calculations of steps, voltage drops, and kVA
8. Descriptive literature describing the standard series specified (not a one-of-a-kind fabrication)
9. Drawing submittal schedule with approval allowance requirements
10. Shipping time after receipt of order
11. Exceptions and clarifications to this specification
12. Factory testing procedures
13. Drawings of the diesel generator set offered hereunder. Literature describing the diesel engine generator set and indicating its current production status.
14. Drawings and/or literature describing auxiliary equipment to be furnished.
15. The following data in tabulated form:
    a. Make of engine
    b. Number of cylinders
    c. Bore, inches (millimeters)
    d. Stroke, inches (millimeters)
    e. Piston displacement, cubic inches (liters)
    f. Piston speed, feet per minute (liters/mim.) at rated RPM
    g. BMEP rated KW output
    h. Make and type of generator
    i. Generator electrical rating, KVA or KW .8 power factor
    j. Number and type of bearings
    k. Exciter type
    l. Generator insulation class and temperature rise
    m. Parts and service support
    n. Engine manufacturer's certified engine BHP curve and certified gen set fuel consumption curve
    o. Electrical loading and performance calculations
16. Foundation design for each location

PART 2. PRODUCTS

2.01 RATINGS

A. Diesel Engine Driven Generating Set, complete with accessories, shall be at minimum the KW rating shown on plans and as manufactured by the following:

1. Taylor Power System
2. Detroit Diesel (Stewart & Stevenson)
3. Kohler
4. Caterpillar

5. MTU/Steward & Stevenson

B. Generator shall be at minimum the KVA shown on plans at a 0.8 power factor. If a particular Manufacturer's unit of kVA shown on plans does not have proper EPA tier ratings or, will not start all loads then, next largest size meeting these requirements shall be used. Voltage rating should be as shown on plans. Generator shall be capable of starting all plant loads sequentially, starting with smallest load first and progressing up to largest load, in steps. Refer to one-line diagram and load analysis on drawing sheets

C. Generator shall be capable of starting loads in sequential order, smallest to largest loads, with not more than 20% terminal voltage drop, and not more than 5% frequency drop. Voltage drop shall be defined as the voltage drop at a period of time specified by the engineer after review of the generator data sheets

D. Contractor shall verify code letter of motors furnished and shall adjust generator size accordingly where code letters vary from design values

E. Generator system shall meet current EPA Tier 1, 2 or 3 status requirements as applicable. Where size shown on plans is not proper tier rated, the next size unit shall be supplied

F. When next size generator is required, all conductor and conduit sizes shall be adjusted accordingly

G. The generator set shall be capable of a Standby 130°C rating while operating in an ambient condition of less than or equal to 77° F and a maximum elevation of 328 feet above sea level

H. Vibration isolators shall be provided between the engine-alternator and heavy-duty steel base.

2.02 ENGINE

A. Type: Liquid cooled, full diesel compression ignition engine, either naturally aspirated or turbocharged. Minimum 4-cycled engine required, or as approved by the Engineer.

B. Rating: Provide an engine with brake horsepower not less than required by the full load rating of the generator, including losses, and with all accessories attached.

C. Speed: The engine speed will be suitable for direct connection to the generator without exceeding engine manufacturer's published curves. Speed must not exceed 1800 RPM

D. BMEP: The engine BMEP will not exceed 310 PSI, when producing rated load. Piston speed shall be 1800 feet per minute or less

E. Electronic isochronous governor capable of 0.5% steady-state frequency regulation.

F. 12-volt positive-engagement solenoid shift-starting motor.

G. 70-ampere automatic battery charging alternator with solid-state voltage regulation.

H. Positive displacement, full-pressure lubrication oil pump, cartridge oil filters, dipstick, and oil drain.

I. Dry-type replaceable air cleaner elements for normal applications.

J. The naturally aspirated engine shall be fueled by natural gas

K. The engine shall be EPA certified from the factory and shall not require a site performance test.

L. Construction (as required):

1. Replaceable liners
2. Two (2) valves per cylinder
3. Full pressure lube system with crankshaft driven oil pump
4. Unit injectors
5. Full flow replaceable oil filter
6. Lube Oil Heater
7. Primary and secondary fuel oil filters
8. Replaceable fuel transfer pump suitable for 6 feet suction lift or, as required for this project
9. Dry type air intake cleaner
10. Fuel water separator with see-through polycarbonate bowl and manual drain

M. Starting System

1. Heavy duty, battery driven electric starter motor.
2. A fully charged 24-volt lead acid, impact resistant, storage battery or batteries mounted on the unit. Make battery capacity sufficient for four cranking cycles at firing speed of 10 seconds duration each, with 15 seconds rest periods- Provide all battery cables, connections, electrolyte, and a hydrometer. Battery rack to have rubber coating or epoxy paint

N. Cooling System: The generator set will be furnished with a unit mounted radiator having sufficient capacity for cooling the engine when delivering full rated horsepower at the design ambient. The fan is to be engine driven pusher type. An immersion heater shall be furnished in the jacket water system. Where unit mounted radiator does not have sufficient cooling capacity a remote cooling system shall be furnished by Generator Supplier and shall include all equipment devices and pumps, expansion tanks, piping, and appurtenances required for a complete operating system

O. Exhaust System: High degree, critical rated 316 stainless exhaust system with maximum silencing capacity mounted on unit. Include a suitable length of flexible 316 stainless steel exhaust tubing for mounting between engine and muffler. When V type engines are used, a wye type flex will be furnished all exhaust system components to be 316 stainless steel. Provide (1) digital exhaust gas temperature meter on in-line engine or (2) on “V” engine. Digital readout to be included in engine/generator control panel

P. Fuel System (As Required):

1. Diesel Generator:

a. Engine driven, self-priming fuel pump suitable for unassisted transfer of fuel from the fuel tank to the engine. Provide fuel pump capable of satisfactory flow from tank to generator at distance shown on plans. Optional fuel pump may be installed at tank location by providing all power and control circuits and equipment required for complete operating fuel system

b. The engine shall be fueled by Low Sulfur Diesel

c. Where shown on plans, provide fuel tank meeting UL 142, unless noted otherwise. Capacity will be for hour operation at maximum load noted on plans or for gallon shown on plans.

d. Full flow fuel/water separator with see-through polycarbonate bowl and drain.

e. Full flow replaceable element fuel filter.

f. Fuel connection lines between tank and engine.

g. Provide governor of the full electronic type to maintain frequency stability at any constant load, including no load, within plus or minus 1/4 percent, and to maintain frequency regulation between no load steady state and full load steady within 3 percent

h. Fuel restriction indicators.

i. Air filter restriction indicators.

j. Generator Manufacturer shall designate piping entry into generator and shall consult with Contractor on fuel pipe sizes and routing. It is Contractors responsibility to secure Manufacturer’s directions and advise for a proper fuel system operation

k. Contractor shall provide full tank of fuel after testing is completed

Q. Provide governor of the full electronic type, Woodward or an approved equal, to maintain frequency stability at any constant load, including no load, within plus or minus 1/4 percent, and to maintain frequency regulation between no load steady state and full load steady within 3 percent.

R. Battery Charger: A static, solid-state type battery charger unit, which automatically controls the charge rate. Include a charging rate ammeter, thermal overload circuit and transformer. The charge shall be suitable for operation at 120 volts single phase, 60 Hertz. The maximum charging time to bring the batteries up to full charge will be 12 hours. Mount charger on unit, using adequate vibration devices. Charger shall be of the dual rate type.

S. Engines used in proposed generator se to be certified to comply with current US EPA and CARB Mobile Off-Highway Emission Limits when tested per ISO 8178 D2. Engines used shall also comply with TCEQ air quality regulations at location and time of installation.

T. Generator Manufacturer shall designate piping entry into generator and shall consult with Contractor on fuel pipe sizes and routing. It is Contractors

responsibility to secure Manufacturer's directions and recommendations for a proper fuel system operation.

2.03 DOUBLE WALL SECONDARY CONTAINMENT SUB-BASE FUEL TANK

A. Where installation of sub-base fuel tank is shown on plans and elevates generator controls above normal access level, Contractor to provide an approved stair/platform structure for access to controls and generator components. Provide shop drawings for Engineer's approval. Provide 48-hour capacity fuel tank following UL 142 or UL 2085 requirements based on client ordinances and requirements

B. The sub-base fuel system is listed under UL 142, subsection entitled Special Purpose Tanks EFVT category, and will bear their mark of UL Approval according to their particular classification.

C. The above ground steel secondary containment rectangular tank for use as a sub base for diesel generators is manufactured and intended to be installed in accordance with the Flammable and Combustible Liquids Code—NFPA 30, the Standard for Installation and Use of Stationary Combustible Engine and Gas Turbines—NFPA 37, and Emergency and Standby Power Systems—NFPA 110.

D. Primary Tank. It will be rectangular in shape and constructed in clam shell fashion to ensure maximum structural integrity and allow the use of a full throat fillet weld.

E. Venting. Normal venting shall be sized in accordance with the American Petroleum Institute Standard No 2000, Venting Atmospheric and Low-Pressure Storage Tanks not less than 1-1/4" (3 cm.) nominal inside diameter.

F. Emergency Venting. The emergency vent opening shall be sized to accommodate the total capacity of both normal and emergency venting and shall be not less than that derived from NFPA 30, table 2-8, and based on the wetted surface area of the tank. The wetted area of the tank shall be calculated on the basis of 100 percent of the primary tank. The vent is spring pressure operated: opening pressure is 0.5/psig and full opening pressure is 2.5 psig. The emergency relief vent is sized to accommodate the total venting capacity of both normal and emergency vents.

G. Fuel Fill. There shall be a 2" NPT opening within the primary tank and lockable manual fill cap.

H. Fuel Level. A direct reading, UL listed, magnetic fuel level gauge with a hermetically sealed vacuum tested dial shall be provided to eliminate fogging.

I. Low Fuel Level Switch. Consists of a 30-watt float switch for remote or local annunciation of a (50% standard) low fuel level condition.

J. Leak Alarm. Consists of a float switch for remote or local annunciation of a fuel in basin condition.

2.04 ALTERNATOR

A. The alternator shall be salient-pole, brushless, 2/3-pitch, self-ventilated with drip-proof construction and amortisseur rotor windings and skewed for smooth voltage waveform. The ratings shall meet the NEMA standard (MG1-32.40) temperature

rise limits. The insulation shall be class H per UL1446, and the varnish shall be a fungus resistant epoxy. Temperature rise of the rotor and stator shall be limited to. The excitation system shall be of brushless construction controlled by a solid- state voltage regulator capable of maintaining voltage within ±1.0% at any constant load from 0% to 100% of rating. The AVR shall be capable of proper operation under severe nonlinear loads and provide individual adjustments for voltage range, stability and volts-per-hertz operations. The AVR shall be protected from the environment by conformal coating. The waveform harmonic distortion shall not exceed 5% total RMS measured line-to-line at full rated load. The TIF factor shall not exceed 50.

B. Rating:

1. 480/277V - 3 phase, 4 W, grounded neutral or 120/240-volt, 3 phase, 4 wire Delta, as shown on plans
2. Frequency - 60 Hertz.
3. Minimum KW and KVA, rating as shown on plans.
4. Power Factor - 0.8.
5. The generator shall be inherently capable of sustaining at least 250% of rated current for at least 10 seconds under a 3-phase symmetrical short circuit without the addition of separate current-support devices.

C. Insulation System: Class H, 150 degrees Celsius rise over a 40 o C ambient. Generator not to exceed 105 degrees Celsius over 40 degrees Celsius ambient at 100% rated power

D. Instantaneous Voltage Dip: Less than 20 percent when full load is applied to the unit

E. Voltage Stability: Maintain within plus or minus 2 percent of rated voltage at any constant from no load to full load.

F. Voltage Regulation - Maintain within plus or minus 1-1/2 percent deviation from rated voltage between no load steady state and full load steady state. Voltage regulation shall allow motor starting with solid state soft starters and reduce voltage autotransformer starters and shall maintain continuous power to the starter during the transition from Start to Run phase of operation.

G. Coupling: From engine, drive rotor through a semi-flexible coupling to ensure permanent alignment.

H. Strip Heaters: Provide low surface temperature space heaters to prevent condensation.

I. Generator set shall have automatic controls to protect alternator from overload. Controls shall be independent of main breaker, which shall not be depended on or, used for, generator protection. Controls shall be provided to monitor the output current of the generator set and initiate an alarm when load current exceeds 110% of the rated current of the generator set on any phase for more than 60 seconds. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator for both single phase and three phase fault conditions. The system shall control the alternator output to

provide 300% of rated current under short circuit conditions, for both single phase and three phase faults. Systems, which regulate single phase and three phase faults at identical excitation levels, are not acceptable. There shall be no exceptions to this requirement, regardless of standards for manufacturers listed in Item 2.01 – "Ratings."

J. Provide 100% rated circuit breaker. Where alternator is rated for 3 phase, 4 wire service greater than 800 amps, provide GFI trip function per NEC

K. Coordinate generator and accessories such as conductor lugs on breaker and dimensional spaces shown before shipping. Lack of coordination shall be at vendor's risk and at no additional cost to Owner

L. Control and voltage regulator's operation shall not be affected by electrical system leading power factor conditions. Where power factor capacitors may affect generator operation, provide means to disengage capacitors during generator operation

2.05 CONTROL PANEL

A. CONTROLLER - The generator shall have a Digital Controller which is a highly advanced integrated genset control system. The controller shall combine rugged construction with microprocessor technology to offer a product that will hold up to any environment and flexible enough to meet they system needs

1. The controller shall have front panel navigation keys and large LCD display. It shall incorporate easy to navigate menus for setup and configuration without the use of additional PLC's or computer connection. All program functions and software shall be NON-proprietary. Any controller(s) provided with proprietary software shall be provided to the owner with all unlocking keys, required hardware and complete writeable software program free of charge.

2. Description

   a. A microprocessor-based generator set control shall incorporate advanced technology and features into a user friendly, rugged design. It provides front panel and PC programmability. It can sense engine parameters directly via analog senders, or it can communicate with the engine's ECU using SAE J1939 CANBUS communications. This device offers programmable inputs and outputs and programmable logic to allow the users easily customize the operation as desired.

   b. The controller shall have the capability to be configured to have eight additional output contacts, an internal RS-485, an internal industrial modem for remote communications and dialing out to a pager when the controller detects trouble. Controller shall have optional features for enhanced generator protection.

3. Functions

   a. GENSET PROTECTION:

      i. Standard Protection

      ii. Undervoltage (27)

iii. Overvoltage (59)
iv. Underfrequency (81U)
v. Overfrequency (81O)
vi. Enhanced Protection
vii. Phase Imbalance (47)
viii. Generator Overcurrent (51)

b. All Generator Protection features are programmable as Alarms or Pre-alarms.
i. Engine Alarms (Shutdowns)
ii. Low Oil Pressure
iii. High Coolant Temperature
iv. Low Coolant Temperature
v. Overspeed
vi. Overcrank
vii. Engine Sender Unit Failure
viii. Emergency Stop
ix. Battery Charger Failure

c. Pre-Alarms (Warnings)
i. Low Oil Pressure
ii. High Coolant Temperature
iii. Low Coolant Temperature
iv. Battery Overvoltage
v. Weak Battery
vi. Battery Charger Failure
vii. Engine Sender Unit Failure
viii. Engine kW Overload
ix. Maintenance Interval Timer
x. Low Coolant Level
xi. High Fuel Level
xii. Low Fuel Level
xiii. Fuel Leak Detect

d. All Alarms and Pre-Alarms can be enabled or disabled via the Digital Genset Controller software or the front panel.

e. GENSET METERING
i. Metered generator parameters include voltage, current, Hz, real power (watts), apparent power (VA), and power factor.
ii. Metered engine parameters include oil pressure, coolant temperature, RPM, battery voltage, fuel level, engine runtime, and various J1939 supported parameters.

4. Features shall include,
    a. Generator Metering
    b. Engine Metering
    c. Genset Control
    d. Generator Protection (27, 59, 81O,81U)
    e. Digital Genset Controller
        i. Programming and setup software
        ii. Intuitive and powerful
        iii. Remote control and monitoring
        iv. Programmable Logic
        v. USB communications
    f. Suitable for use on rental gensets with
    g. Hi/Lo line sensing
    h. Single or three phase sensing overrides
    i. SAE J1939 Engine ECU communications
    j. Multilingual capability
    k. Remote communications to our RDP-110 Remote Annunciator
    l. Battery Backup for Real Time Clock
    m. LCD Heater
    n. Extremely rugged, fully encapsulated design
    o. 16 programmable contact inputs
    p. 2 Contact outputs: (1) 30 Adc Gen. Run (1) Programmable 1 Adc rated contracts
    q. Wide Ambient Temperature range
    r. Additional (8) Programmable 2 Adc contacts (optional)
    s. Remote Dial-out and Dial-in capability with Internal Modem (optional)
    t. Enhanced Generator Protection 51 and 47
    u. Modbus Communications with RS-485
    v. Expandable I/O capability via J1939 CANBUS (optional)
    w. UL recognized, CSA certified, CE approved
    x. HALT (Highly Accelerated Life Tests) tested
    y. IP 54 Front Panel rating with integrated gaskets
    z. NFPA110 Level Compatible
5. ENGINE CONTROL
    a. Cranking Control: Cycle or Continuous (Fully Programmable)
    b. Engine Cooldown: Smart Cooldown function saves fuel and engine life.
    c. Successful Start Counter: Counts and records successful engine starts
    d. Timers:
        i. Engine Cooldown Timer

ii. Engine Maintenance Timer
iii. Pre-Alarm Time Delay for Weak/Low Battery Voltage
iv. Alarm Time Delay for Overspeed
v. Alarm Time Delay for Sender Failure
vi. Arming Time Delays after Crank Disconnect:
1. Low Oil Pressure
2. High Coolant Temperature
vii. Pre-Crank Delay
viii. Continuous or Cycle Cranking Time Delay

e. Provide Keyed cranking panel that bypasses the controller and safeties to crank the engine in the event the controller fails.

6. EVENT RECORDING

a. The controller shall have an event recorder that provides a record of alarms, pre-alarms, engine starts, engine runtime loaded, engine runtime unloaded, last run date, and many other events that are all date and time stamped to help the user determine the cause and effect of issues related to the generator set.

b. BATTERY BACKUP FOR REAL TIME CLOCK

i. A ten-year (typical life) lithium battery is used to provide long term maintenance for the real time clock setting. This battery is serviceable by removing the rear cover. All settings, programming, and even records are saved in non-volatile memory and do not require battery backup.

B. OVERLOAD PROTECTION CIRCUIT BREAKER- A main line molded case 3-pole circuit breaker shall be installed as a load circuit interrupting and protection device. It shall operate both manually as an isolation switch and automatically during overload and short circuit conditions. The trip unit for each pole shall have elements providing inverse time delay during overload conditions and instantaneous magnetic tripping for short circuit protection. The circuit breaker shall meet standards established by Underwriter's Laboratories, National Electric Manufacturer's Association, and National Electric Code. The circuit breaker shall be mounted in NEMA-1 type enclosure in or adjacent to the generator control panel

C. AUTOMATIC START-STOP SYSTEM- The engine starting panel shall automatically provide a minimum of four cranking and three rest periods. Operation shall be initiated by the closing of contacts in the automatic transfer switch. The automatic starting panel control switch shall include the positions of "Automatic", "Off", and "Test". The automatic starting panel shall contain 24-volt alarm lights energized by the safety controls. A 24-volt visual light shall also be energized if the engine has started by the end of the final cranking cycle. The panel and selector switch shall be mounted in the generator control panel. A green light shall indicate when the selector switch is in the "automatic" power.

D. General: Provide a solid-state control panel mounted to unit, which includes, but is not limited to, the following instruments and protective devices.

1. AC ammeter
2. Phase selector switch.
3. Current transformers.
4. AC voltmeter.
5. Automatic solid-state voltage regulator.
6. Rheostat for adjusting voltage plus or minus 5 percent of rated voltage.
7. Engine Malfunction Warning Lights:
    a. Low oil pressure.
    b. High water temperature.
    c. Engine over crank.
    d. Engine overspeed.
8. Frequency meter.
9. Non-resettable elapsed time meter with a 9,999.9-hour maximum indication.
10. Coolant temperature gage.
11. Oil pressure gage.
12. Main circuit breaker - molded case type.
13. Combination alarm-shutdown system with manual reset and indicating lights for high engine temperature, low oil pressure, engine overspeed, and engine fail-to-start. Include an additional set of contacts for remote alarms
14. Manual start/stop switch for control of engine.
15. Alarm dry contact closures as follows:
    a. Low oil pressure
    b. High water temperature
    c. Engine over crank
    d. Engine run
    e. Low fuel pressure
    f. Fuel low level
16. Remote control contacts as follows:
    a. Engine start via transfer switch (which will include power transfer).
17. Provide latest electronic control panel at engine
18. Control panel space heater
19. Provide space heater in generator set mounted control panel to prevent condensation

E. Provide remote annunciator with minimum of (6) six programmable relays for use as alarm outputs unit to be recess mounted in door of automatic transfer switch,

except where ATS is outdoors, in which case annunciator shall be installed in the inner panel of the ATS or, on wall in MCC Room as shown on plans or otherwise designated by Engineer. Wall surface mounted annunciator shall be installed in manufacturer's surface mounted style box. Recessed mounted annunciator shall be installed in recessed box with annunciator free place trim flush with wall

F. Contractor shall provide fail and problem alarms and run signals to monitoring station at Operator's room to autodialer/SCADA System, when present. Provide circuits, devices, expansion modules, and programming as required for autodialer/SCADA System

G. Non-resettable elapsed time meter with a 9,999.9-hour maximum indication

H. Provide data port for use with SCADA monitoring of generator status using ModBus protocol via Ethernet. Provide CD with program, information and status display. Provide generator communications interface module with Ethernet connector, power supply, programming for SCADA system use and all appurtenances. Provide compatible HMI template for specific generator. Provide all addresses, HMI templates, and software required for display on SCADA HMI. Provide Owners copy of Manufacturer's software for use in displaying generator data. Include Manufacturers time for assisting in installation and set-up of program. Assist Systems Integration Engineer in setting up plant controller PLC and/or SCADA

I. Provide factory built, U.L. listed, remote annunciator that interfaces with generator control panel

2.06 ENGINE START/STOP CONTROLS

A. The engine controls shall be provided with bypassing of the low oil pressure shutdown circuitry during start-up.

B. B. If unit fails to start in an appropriate time (normally 30 seconds), the starting circuit shall shut down for an appropriate time (approximate 10 seconds) and then repeat the start cycle. If the unit still fails to start after approximately four start attempts, the over crank alarm shall activate, and the starting circuit shall shut down.

C. The engine start/stop control shall be static solid state.

2.07 BASE

A. Mount the assembled packaged unit on a base of welded structural steel, box type construction. Prime all exposed metal parts with a rust inhibitor and finish in durable machinery enamel.

B. Vibration isolators shall be of the steel spring type.

2.08 WEATHERPROOF HOUSING – (WHERE INDICATED ON PLANS)

A. Construction: Provide an overall weather protective housing with removable side panels and a hinged, padlockable meter panel door to make the engine generating plant suitable for outdoor installation. In addition, sound levels at the nearest

property line shall not exceed 58 db at project locations within the city limits or ETJ. Where sound attenuating housing is shown on plans, provide according to those specifications

B. Painting: Prime all exposed metal parts with a suitable rust inhibitor applied to the clean, bare metal, followed by two coats of epoxy paint for exterior weather.

C. All doors and access panels shall be lockable. Provide mechanical (non-magnetic) contact switches on all moveable panels and doors to detect entry into generator enclosure

D. Contractor to coordinate with manufacturer on housing size prior to constructing concrete pad

E. Provide low voltage transformer, panel and appurtenance sized for all low voltage requirements at generator. Provide feeder circuit from Motor Control Center.

F. Enclosure manufacturer shall be consulted for piping and conduit entries into housing. Also, coordinate with generator manufacturer and engineer before installing.

2.09 GENERATOR CONCRETE FOUNDATION

A. Provide concrete pad as shown on plans. Use 3000-psi concrete with #5 rebar 12” O.C. Coordinate pad construction with generator drawings and weight

2.10 GENERATOR ACCESS

A. Where generator controls or enclosure step-up height is greater than 18 inches above grade, Contractor shall provide concrete or galvanized steel steps for access to controls or to enclosure

2.11 GENERATOR MONITORING SYSTEM

A. Provide interface to the generator solidstate controller and route data signal (ModBus TCP) to data switch as shown on plans.

B. Provide all software, programming, and devices required for monitoring trouble status, run status, alternator loading, fuel tank level, and all other available status signals. Provide HMI templates for display on SCADA HMI. Route data cable to monitoring station PLC via Ethernet switch as shown on plans. Assist in setting up system during construction, testing, demonstrations to Owner, and final inspection

C. Provide all addressing information needed to display all alarm, function, and status information at PLC HMI. Send information on CD or via e-mail to Engineer

D. Provide and install separate conduit with control and wire integrity monitoring wire from main power conductors. Where not shown on drawings, contractor shall provide and install separate conduit per this specification and latest requirements of NEC.

2.12 GENERATOR INSTALLATION

A. Contractor shall consult with Generator Manufacturer on all aspects of generator installation to assure all work is proper and professional

2.13 STORAGE

A. Where generator is stored on site prior to installation, provide any heating or other measures required to prevent moisture accumulation in high humidity areas. Consult Manufacturer for requirements

2.14 INHIBIT RELAYS

A. Where generator is not designed to carry full load of motors, provide inhibit relay for each motor starter over 5 horsepower to inhibit motor starter operation when generator runs. Relay is to be energized by generator run signal from ATS or generator. Provide bypass switch across the inhibit relay contacts to allow selected motors to run on generator power

2.15 GENERATOR ACCESSORIES AND MISCELLANEOUS EQUIPMENT

A. Contractor shall provide power, control, and instrument circuits as well as all fuel source piping and devices, cooling equipment, pumps, and related appurtenances, and all accessory equipment that is standard factory component supplied by the generator manufacturer.as part of this installation. Contractor shall coordinate all requirements with generator vendor and include all materials and design in bid cost

2.16 SIGNAGE

A. Provide all signage shown on drawings and required per NEC.

2.17 ACCESSORIES

A. Battery Charger. An automatic float and equalize battery charger with +/- 1% constant voltage regulation from no load to full load over +/-10% AC input line variation, current limited during engine cranking and short circuit conditions, temperature compensated for ambient temperatures from -40oC to +60oC, 5% accurate voltmeter and ammeter, fused, reverse polarity and transient protected. Provide meters and alarm contacts for remote alarms

B. Battery Rack and Cables. Battery rack and battery cables capable of holding the manufacturer's recommended batteries shall be supplied.

C. Block Heater. The block heater shall be thermostatically controlled and sized to maintain manufacturers recommended engine coolant temperature to meet the start-up requirements of NFPA 99 and NFPA 110, Level 1.

D. Circuit Breaker. A UL 489 listed 100% rated line circuit breaker, molded-case type, generator-mounted with load side lugs.

E. Critical Silencer. The engine exhaust silencer shall be temperature and rust resistant and rated for critical applications. The silencer will reduce total engine exhaust noise by 25-35 db(A).

F. Flex Exhaust Tube. The exhaust piping shall be gas proof, seamless, stainless steel, flexible exhaust bellows with threaded NPT connection.

G. Flexible Fuel Line. The flexible fuel line shall have a fitting for the engine inlet and a threaded pipe fitting for connection to the stationary piping

H. Standard Air Cleaner. The air cleaner shall provide engine air filtration which meets the engine manufacturer's specifications under typical operating conditions.

I. Remote Annunciator. Flush Mount Remote Annunciator meeting NFPA-110 requirements.

J. Remote Emergency Stop Switch. Break-Glass Type

K. Oil and Coolant Drains with Valves. Piped to edge of skid

L. Manual Key Bypass Switch. Provide manual key override bypass switch that allows starting of the generator manually in the event of control systems failure.

PART 3. EXECUTION

3.01 TESTING

A. All performance and temperature rise data submitted by the manufacturer above and shall be the result of actual test of the same or duplicate generator. Temperature rise data shall be the result for full load, 0.8 power factor heat runs at the rated voltage and frequency. This testing shall be done in accordance with MIL-STD-705 and IEEE standard 115.Before the equipment is installed, a factory test log of the generator set showing a minimum of 3/4 hour testing with 1/2 hour at 100 percent rated load at 0.8 power factor, continuously, shall be submitted to the purchaser. Voltage and frequency stability and transient response at 1/4, 1/2 and full load shall also be recorded. Normal preliminary engine and generator tests shall have been performed before unit assembly. Prior to acceptance of the installation, the equipment shall be subjected to an onsite cold start block test at 100% load followed by 4-hour resistive load bank test with a minimum of 2 hours at 100% load. All consumables necessary for this test operation shall be furnished by the contractor. Any defects which become evident during this test shall be corrected by the contractor at this own expense. All testing shall be performed by the contractor and witnessed by owner. Test equipment must be calibrated within the previous 12 months

B. To ensure that the equipment has been designed and built to the highest reliability and quality standards, the manufacturer and/or local representative shall be responsible for two separate tests: final production tests and site tests.

C. Production Tests: Each generator set shall be tested under varying loads with guards and exhaust system in place. Tests shall include:

1. Single-step load pickup
2. Transient and steady-state governing

3. Safety shutdown device testing
4. Voltage regulation
5. Rated Power @ 0.8 PF
6. Maximum power
7. Upon request, a witness test, or a certified test record sent prior to shipment.

D. Units shall be factory tested under design conditions. Engineer and/or Owner may witness test. Vendor shall give one (1) week notice to Engineer before test is conducted

E. Perform startup test to ensure all systems work properly together to include transfer switches, annunciator panel and other associated accessories

F. The manufacturer's distribution representative shall perform an installation check, startup, and 4-hour full load test utilizing a resistive type load bank. The engineer, regular operators, and the maintenance staff shall be notified of the time and date of the site test. The tests shall include:

1. Utilizing a resistive load bank, load test the generator set as follows:
    a. Load should be applied as 50% of the generator name plate output for the first 30 minutes, 75% of the generator name plate output for the next 30 minutes, 100% of the generator name plate output for the next 60 minutes, for a total run time of least 2 hours
    b. Fuel, lubricating oil, and antifreeze shall be checked for conformity to the manufacturer's recommendations, under the environmental conditions present and expected.
    c. Accessories that normally function while the set is standing by shall be checked prior to cranking the engine. These shall include block heaters, battery chargers, alternator strip heaters, remote annunciators, etc.
    d. Generator set startup under test mode to check for exhaust leaks, path of exhaust gases outside the building, cooling air flow, movement during starting and stopping, vibration during operation, normal and emergency line-to-line voltage and frequency, and phase rotation.
    e. Automatic start by means of a simulated power outage to test remote-automatic starting, transfer of the load, and automatic shutdown. Prior to this test, all transfer switch timers shall be adjusted for proper system coordination. Engine coolant temperature, oil pressure, and battery charge level along with generator set voltage, amperes, and frequency shall be monitored throughout the test.
    f. At a minimum, record the following at least every 15 minutes during the test:
        i. Time
        ii. Frequency (Hz)
        iii. Battery voltage (DC)
        iv. Voltage (AC-L1, L2, L3)

v. Coolant Temperature
vi. Power Factor (1.0)
vii. Ambient temperature
viii. KW
ix. Exhaust temperature
x. Load percentage

G. Perform a plant load test as follows:

1. After the resistive load bank test has been completed, perform a plant load test to confirm generator can run connected loads as designed. Testing shall be performed as a complete simulation of power loss- ie shut off main disconnect and observe generator starts and ATS transfers to back-up source as required. All loads shown for connection shall be operated for up to 15 minutes (full load) unless system parameters do not allow pumps to run for that amount of time. Coordinate system parameters with plant Operator who shall be present for all plant load testing. Allow plant to run on generator under normal conditions for minimum of 1 hour. Record all values as shown for load bank testing every 5 minutes during plant load test.
2. Allow generator to run unloaded for at least 5 minutes before shutting down

H. Field Tests

1. Units shall be factory tested under design conditions. Purchaser, at his option, may witness test. Vendor shall give one (1) week notice before test is made
2. Perform field tests at the site after installation is complete and in the presence of the Owner's representative to verify that unit meets start up sequences listed
3. Manufacturer's Representative shall conduct field tests after electrical installation is completed and shall provide a certified report of these tests for the Owner and Engineer. The tests shall include sequential stating of all motor loads and recording the voltage dip as each motor starts. This report shall be sent to Engineer no less than 10 working days prior to "Final Acceptance" testing. Operation of system shall be demonstrated to Owner and Engineer by the Representative during setup tests and at final inspection and testing
4. Load testing shall be performed using a reactive load bank sized to simulate all loads running with largest load then applied. Provide written report of tests for Engineer's review
5. The following minimum work shall be performed by the Contractor and Manufacturer's Representative under the technical direction of the manufacturer's service representative. Allow for a minimum of twelve (12) days for factory technician including all expenses for the following services:
    a. Inspection and final adjustments for startup, and acceptance testing.
    b. Operational and functional test of controllers.
    c. Participation in commissioning services. Technical representative shall be present for duration of commissioning test related to vendor equipment

6. The contractor shall provide three (3) copies of the manufacturer's field start-up report before final payment is made

3.02 LOAD LIMITING

A. Where generator is not sized to carry all motor loads simultaneously, Contractor shall provide inhibit relays and bypass switches to prevent operation of selected loads when on standby power

3.03 INSTALLATION

A. Installation of generator shall be according to Manufacturer's instructions and shall be witnessed and inspected by Manufacturer's Representative

B. Do not install vibration isolation rubber pads at random locations under skids. Place continuous pad, that is width of skids or, do not place at all. Manufacturer is to advise on this requirement.

C. Install on concrete pad that is sloped to avoid any standing water under generator or skids. Standing water test will be conducted and where water stands, the concrete slab shall be reworked to provide satisfactory installation.

D. Generator frame is to be bonded to ground grid via exothermic welded connection with 2/0 bare cu conductor (minimum)

E. Fuel source piping shall be stubbed up in PVC sleeve and routed under generator pad to proper location. Confirm exact location of stub-up in generator with manufacturer

F. Refer to grounding specification for additional requirements.

3.04 OIL PAN

A. Provide galvanized steel oil pan beneath engine to catch oil drips. Provide drain valve with oil resistant drain hose extending to the skid and attached with stainless steel clamp to prevent oil spills when draining oil pan.

3.05 OIL DRAIN

A. Provide oil pan valve with oil resistant drain hose extending to the skid and attached with stainless steel clamp to prevent oil spills when draining oil pan

3.06 FIRE EXTINGUISHER

A. Provide two (2) high quality portable fire extinguishers noted for diesel fuel fire suppression. Provide mounting brackets and install on both sides of the enclosure doors located in the electrical control panel area. Coordinate location with Owner.

3.07 EAR PROTECTION

A. Provide dispenser with disposable ear protection devices on inside of generator enclosure near entry at controls section

3.08 FUEL REQUIREMENTS

A. Contractor shall provide all fuel required for use during the construction phase. Fuel tank shall be full when the facility is turned over to the Owner after final acceptance

3.09 MAINTENANCE/WARRANTY

A. Warranty

1. Contractor shall provide the Generator Manufacturer's full 5-year comprehensive extended coverage service warranty on the generator installation and shall include all labor and materials required to repair or replace equipment and/or components that are defective or malfunctioning. Included under this warranty shall be all equipment, devices, hardware, and software. This warranty shall begin on date of written "Final Acceptance" of the electrical systems and to be executed as required at no additional cost to the Owner. Contractor's warranty shall also guarantee 24-hour service response time and shall provide labor, work, or materials as necessary to maintain plant operation when replacement parts are on order. In no case shall plant electrical systems be out of service for more than 24 hours from time Owner calls for warranty service. This shall be provided at no additional cost to the Owner. All equipment and materials installed shall have full warranty from Manufacturer that guarantees equipment is rated for harsh industrial electrical/mechanical environment in which it is installed
2. Where Manufacturer's products fail prematurely, Manufacturer shall be fully responsible for new replacement and shall not have the option of declaring that failures were caused by environmental conditions and its effect on the product. Contractor is fully responsible for assuring that Product Manufacturers are aware of this condition and that warranty statement is included in shop drawing submittals. Failure to do so will be at the Contractor's expense and at no additional cost to the Owner
3. All critical warranted repairs shall be made within 24 hours of receipt of required parts from Manufacturer with reasonable delivery time of overnight shipping. Any repairs not completed within 5 working days from date of notice are subject to Owner making other arrangements for repair and back charging Contractor. This requirement is a condition of this contract
4. Where equipment or instrument problems remain unresolved by Contractor beyond a reasonable time, a Factory Technician shall be provided on-site to take any corrective actions necessary to put equipment or instruments in operating order. Owner and Engineer reserve the right to determine a reasonable time for corrective action by Contractor
5. The generator supplier shall regularly engage in maintenance contract programs to perform preventive maintenance and service on equipment similar to that specified. A service agreement shall be available and shall include system operation under simulated operating conditions; adjustment to the generator set, transfer switch, and switchgear controls as required, and

certification in the owner's maintenance log of repairs made and function tests performed on all systems.

END OF SECTION

Section 16261

Automatic Transfer Switch

PART 1. GENERAL

1.01 SUMMARY

A. This specification is confidentially issued for this specific project only

B. Contractor shall be responsible for reading all specifications from all disciplines prior to bid

C. Contractor shall contact local Factory Representative to verify all equipment purchased conforms to the requirements of this project. Failure to do so may result in equipment removal and replacement at Contractor's expense

D. Under no conditions shall transfer switch ampacity be rated less than main service breaker ampacity

E. Transfer switches with cable linkage when in manual mode are not accepted. Coordinate power and controls with Generator Manufacturer where generator is shown on Plans

F. All equipment, instruments and devices provided for this project shall have means of protection from power line conditions such as surge, phase fail, or other line conditions that may damage equipment, instruments or devices furnished. It is vendors and manufacturers' responsibility to provide protective devices as required for maintaining warranty of furnished items and to assure no damage occurs from power line conditions

1.02 SCOPE OF WORK

A. An automatic transfer switch shall be installed and rated at 480 Volts and 60 HZ and be mechanically held and electrically operated by a single solenoid mechanism energized from the source to which the load is to be transferred and capable of manual operation by one person. The switch shall be mechanically and electrically interlocked to ensure one of the two positions - normal or emergency. The switch shall be applicable to 50 Hz or 60 Hz and suitable for all common voltages from 110 to 600. Switch shall be service entrance rated and housed in a NEMA 4X 316 stainless steel enclosure and shall conform with the provisions of underwriter's Laboratories 1008 Standards and meet the National Electric Code (NEC) requirements for critical applications.

B. Accessories- Transfer switches shall be equipped with the following accessories:

C. Time delay to retransfer to normal power source: Time delay to be provided for retransfer from emergency power to normal power (if restored and within acceptable operating parameters). This time delay is to be automatically bypassed in the event the emergency source fails and normal power is available. Retransfer time delay to be field adjustable from 0-30 minutes.

D. Unit to be shipped with the initial transfer to normal power source time delay set at 5 minutes.

E. Time delay on engine cooling, (fixed, non-adjustable 5 minutes, -1 to +2 minutes tolerance)

F. Time delay on engine starting, (adjustable 0.5 to 60 seconds)

G. A test switch to simulate a normal power source failure

H. Pilot contact to initiate engine starting control.

I. Pilot lights to visually indicate the transfer switch position

J. Relay contacts as required plus one spare set of normally open and normally closed relay contacts

K. Provide solid state exerciser clock to set the day, time, and duration of generator set exercise/test period. Provide a with/without load selector switch for the exercise period.

1.03 REFERENCES

A. National Fire Protection Association (NFPA): NFPA 70 - National Electrical Code (NEC)

B. National Electrical Manufacturers Association (NEMA): NEMA ICS 2-447- AC Automatic Transfer Switches

C. Underwriters Laboratories (UL): UL 1008 - Standard for Automatic Transfer Switches

1.04 SUBMITTALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

B. Submit all products covered under this specification for engineer’s approval. Contractor shall submit transfer switch data to power company for approval prior to submitting to engineer

C. Manufacturer shall submit shop drawings for review, which shall include the following, as a minimum:

1. Descriptive literature
2. Plan, elevation, side, and front view arrangement drawings, including overall dimension, weights and clearances, as well as mounting or anchoring requirements and conduit entrance locations.
3. Installation exhibit showing dimension and spacing between existing equipment
4. Schematic diagrams
5. Wiring diagrams
6. Accessory list
7. Training outline

8. Manufacturers testing reports as requested

PART 2. PRODUCTS

2.01 MANUFACTURER'S

A. ASCO

B. Cummins

C. Eaton

D. Five Star Electric

E. Lexington Zenith

F. Russelectric

G. Generator manufacturer provided ATS, or equal, as pre-approved in writing. No substitutions allowed except where pre-approved in writing by Engineer

H. Listing of acceptable Manufacturers does not relieve obligation of conditions described in this Specification Section

2.02 CONSTRUCTION

A. General:

1. The delayed transition automatic transfer switch shall be furnished as shown on the drawings. Voltage and continuous current ratings and number of poles shall be as shown. Switches shall be UL listed in accordance with UL-1008

Where transfer switch is shown on one-line diagram or on details as installed directly after service head and, where no overcurrent protection precedes the transfer switch, a service rated, breaker type switch shall be provided

Ampacity of transfer switch contacts shall be rated equal or greater than ampacity of main service breaker. No exceptions

2. On 3 phase, 4 wire systems, utilizing ground fault protection downstream of the transfer switch, a true 4-pole switch shall be supplied with all four poles mounted on a common shaft. The continuous current rating and the closing and withstand rating of the fourth pole shall be identical to the rating of the main poles and shall have quick-break contacts. See plans for 4 pole requirements. This requirement does not apply for water and wastewater facility installation

3. The transfer switch shall be mounted in a NEMA 4X 316 S.S. for outdoors, unless otherwise indicated. Indoor enclosures shall be fabricated from 12-gauge steel. The enclosure shall be sized to exceed minimum wire bending space required by UL 1008. Outdoor enclosures shall have no exposed controls. Fabricated covers over exposed controls are not allowed. Controls shall be located on inner door of automatic transfer switch. Enclosure shall have three (3) point latching handle with locking hasp. Where shown on plans in MCC, transfer switch enclosure shall match MCC enclosure

4. The transfer switch shall be equipped with an internal welded steel pocket, housing an operations and maintenance manual
5. The transfer switch shall be top and bottom accessible
6. The main contacts shall be capable of being replaced without removing the main power cables, or removing incoming normal power from service rated transfer switches
7. The main contacts shall be visible for inspection without any major disassembly of the transfer switch
8. All bolted bus connections shall have Belleville compression type washers
9. When a solid neutral is required, a fully rated bus bar with required AL-CU neutral lugs shall be provided. All grounding and neutral conductors shall be terminated and labeled per article 250 of latest edition of National Electrical Code
10. Control components and wiring shall be front accessible. All control wires shall be multi-conductor 18-gauge 600-volt SIS switchboard type point-to-point harness. All control wire terminations shall be identified with tubular sleeve-type markers
11. The switch shall be equipped with 90 degrees C rated copper/aluminum solderless mechanical type lugs
12. The complete transfer switch assembly shall be factory tested to ensure proper operation and compliance with the specification requirements. A copy of the factory test report shall be available to engineer with ATS submittal upon request
13. Transfer time shall be of sufficient duration to allow motor run controls to drop out or, Contractor shall provide additional time delay controls in the neutral position, both directions of transfer to accomplish this function
14. Provide 480: 120/240-volt, single phase transformer and all required circuit breakers to provide low voltage power to all generator heaters, controls, etc. Feed from load motor control center or, from side of ATS where shown on plans
15. All power and control circuits to have circuit breakers for overcurrent protection. Fuses are not acceptable. No Exceptions
16. All doors on outdoor enclosures shall have door restraints, 3-point latching handle and locking hasp. Keyed handles are not acceptable
17. No devices or controls are to be installed on outer door of outdoor enclosures or where NEMA 4X rated
18. Provide generator status annunciator with voltage, current, and phase indicators and run time (non-resettable) elapse time meter in panel (door) of indoor transfer switch. Provide nameplate. Flush mount annunciator. Where ATS is located outdoors or in NEMA 4 X enclosure, mount status annunciator in inner door panel. Installation to be completed by ATS Factory Technician

19. Install Generator Manufacturer furnished alarm annunciator panel on wall near ATS or as shown on plans
20. All circuit breakers shall be covered. No exposed circuit breakers. No exceptions
21. Provide heater with thermostat control in all enclosures. Route 120 VAC circuit from LVP. Provide circuit breaker
22. Provide all power supplies required to operate transfer switch
23. Where transfer switch contains two circuit breakers, and where service breaker serves as main breaker, the transfer switch shall be UL listed, “Service Rated,” and acceptable to Power Company

B. Automatic Transfer Switch:

1. The transfer switch shall be double throw, actuated by two electric operators momentarily energized, and connected to the transfer mechanism by a simple over center type linkage. Cable linkage mechanism is not acceptable
2. The normal and emergency contacts shall be positively interlocked mechanically and electrically to prevent simultaneous closing. Main contacts shall be mechanically locked in both the normal and emergency positions without the use of hooks, latches, magnets, or springs, and shall be silver-tungsten alloy. Separate arcing contacts with magnetic blowouts shall be provided on all transfer switches. Interlocked, molded case circuit breakers or contactors are not acceptable unless specifically shown on Plans, or pre-approved in writing
3. The transfer switch shall be equipped with a safe external manual operator, designed to prevent injury to operating personnel. The manual operator shall be front accessible and shall provide “quick make-quick break” operation, offering the same contact-to-contact transfer speed as the electrical operator to prevent switching the main contacts slowly. The external manual operator shall be UL listed for operation, under load, from the outside of the transfer switch while the door is closed. Door shall have 3-point latching handle. No automatic transfer switch enclosure shall be installed without door; Exerciser timer shall be readily accessible to operator
4. Circuit breakers used for service rated transfer switches shall be mechanically or electrically interlocked in a manner acceptable to the local Power Company
5. Provide all AC and/or DC power supplies required for transfer switch operation. Provide separate batteries and charger where operation requires separate power source independent of normal or generator power sources

C. Automatic Transfer Switch Controls:

1. The transfer switch shall be equipped with a microprocessor-based control system, to provide all the operational functions of the automatic transfer switch. The controller shall have two asynchronous serial ports. The controller shall have a real-time clock with battery backup

2. The CPU shall be equipped with self-diagnostics, which perform periodic checks of the memory I/O, and communication circuits, with a watchdog/power fail circuit
3. The controller shall have industry standard ethernet port connections for communicating with future industrial control system controller via a ethernet data switch
4. The Ethernet communication port shall allow interface to the Manufacturers and/or the Owner's furnished remote supervisory control. Provide all software, programming, testing, and cables and hardware for a complete operating system. Coordinate with SCADA Provider and Programmer and assist in setting up system. Provide all addresses, HMI templates, and function descriptions for Programmer's use. Functions shall include status of all operating time settings such as transfer time, transition delays, etc.
5. The controller shall have password protection required to limit access to qualified and authorized personnel
6. The controller shall include human machine interface with keypad allowing access to the system for generator exercising and time delay modifications
7. The controller shall include three phase over/under voltage, over/under frequency, phase sequence detection and phase differential monitoring on both normal and emergency sources
8. The controller shall store the following records in memory for access either locally or remotely:

   Number of hours transfer switch is in the emergency position

   Number of hours emergency power is available

   Total transfer in either direction

   Date, time, and description of the last four source failures

   Date of the last exercise period

   Date of record reset (where applicable)

D. Sequence of Operation:

1. When the voltage on any phase of the normal source drops below 80% or increases to 120%, or frequency drops below 90%, or increase to 110%, or 20% voltage differential between phases occurs, after a programmable time delay period of 0-300 seconds factory set at 3 seconds to allow for momentary dips, the engine starting contacts shall close to start the generating plant
2. The transfer switch shall transfer to emergency when the generating plant has reached specified voltage and frequency on all phases
3. After restoration of normal power on all phases to a preset value of at least 90% to 110% of rated voltage, and at least 95% to 105% of rated frequency, and voltage differential is below 20%, an adjustable time delay period of 0-3600 seconds (factory set at 300 seconds) shall delay retransfer to allow stabilization of normal power. If the emergency power source should fail during this time delay period, the switch shall automatically return to the normal source

4. After retransfer to normal, the engine generator shall be allowed to operate at no load for a programmable period of 0-3600 seconds, factory set at 300 seconds

E. Automatic Transfer Switch Accessories:

1. Programmable three phase sensing of the normal source set to pick up at 90% and dropout at 80% of rated voltage and overvoltage to pick up at 120% and dropout out at 110% of rated voltage. Programmable frequency pickup at 95% and dropout at 90% and over frequency to pick up at 110% and dropout at 105% of rated frequency. Programmable voltage differential between phases, set at 20%, and phase sequence monitoring
2. Time delay for override of momentary normal source power outages (delays engine start signals and transfer switch operation). Programmable 0-300 seconds. Factory set at 3 seconds, if not otherwise specified
3. Time delay to control contact transition time on transfer to either source. Programmable 0-120 seconds, factory set at 10 seconds
4. Time delay on retransfer to normal, programmable 0-3600 seconds, factory set at 300 seconds if not otherwise specified, with overrun to provide programmable 03600 second time delay, factory set at 300 seconds, unloaded engine operation after retransfer to normal. Time delay in neutral position of switch shall be adjustable 0-300 seconds
5. Time delay on transfer to emergency, programmable 0-300 seconds, factory set at 1 second.
6. A maintained type load test switch shall be included to simulate a normal power failure, keypad initiated.
7. A remote type load test switch shall be included to simulate a normal power failure, remote switch initiated.
8. A time delay bypass on retransfer to normal shall be included. Keypad initiated.
9. Contact rated 10 Amps 30 volts DC, to close on failure of normal source to initiate engine starting.
10. Contact rated 10 Amps 30 volts DC, to open on failure of normal source for customer functions
11. Light emitting diodes shall be mounted on the microprocessor panel to indicate switch is in normal position, switch is in emergency position, and controller is running
12. A plant exerciser shall be provided with ten (10) 7-day events, programmable for any day of the week and (24) calendar events, programmable for any month/day, to automatically exercise generating plant programmable in one-minute increments. Also include selection of either "no load" (switch will not transfer) or "load" (switch will transfer) exercise period. Keypad initiated with password. Provide means to observe and adjust settings locally and via data link to plant PLC controller

13. Provision to select either "no commit" or "commit" to transfer operation in the event of a normal power failure shall be included. In the "no commit position," the load will transfer to the emergency position unless normal power returns before the emergency source has reach 90% of its rated values (switch will remain in normal). In the "commit position", the load will transfer to the emergency position after any normal power failure. Keypad initiated
14. Two auxiliary contacts rated 10 Amp, 120 volts AC (for switches 100 to 800 amps) 15-amp, 120 volts AC (for switches 1000 to 4000 amps), shall be mounted on the main shaft, one closed on normal, the other closed on emergency. Both contacts will be wired to a terminal strip for ease of customer connections
15. A three-phase voltage readout, with 1% accuracy shall display all three phase-to-phase voltages simultaneously, for both the normal and emergency source
16. A frequency readout with 1% accuracy shall display frequency for both normal and emergency source
17. A readout shall display normal source and emergency source availability
18. Signal before transfer contacts.
19. Selector switch to allow transfer by manual push button or switch movement
20. Maintenance Selector Switch: For service rated transfer switches provide means to deactivate switch in "Normal," "Open," or "Emergency" positions when servicing internal parts of switch assembly. Provide means for locking out in any position
21. Provide means to temporarily switch off "All" control voltages that are tapped on the incoming power side of the Normal circuit break for maintenance purposes. This is to remove all live voltages during service of transfer switches
22. Provide all available "Options" for transfer switch

F. Ratings:

1. Delayed transition automatic transfer switches shall have the following 3-cycle short circuit closing and withstand as follows:

   a. RMS Symmetrical Amperes 480 VAC

Amperes	Closing and Withstand	Current Limiting Fuse Rating
100-400	42,000	200,000
600	50,000	200,000
800	65,000	200,000
1000-1200	85,000	200,000
1600-4000	100,000	200,000

2. During the 3-cycle closing and withstand tests, there shall be no contact welding or damage. The 3-cycle tests shall be performed without the use of current limiting fuses. The test shall verify that contacts separation has not occurred, and there is contact continuity across all phases. Test procedures

shall be in accordance with UL-1008, and testing shall be certified by Underwriters' Laboratories, Inc

3. When conducting temperature rise tests to UL-1008, the manufacture shall include post-endurance temperature rise tests to verify the ability of the transfer switch to carry full rated current after completing the overload and endurance tests
4. The microprocessor controller shall meet the following requirements:
    a. Storage conditions - 25 degrees C to 85 degrees C
    b. Operation conditions - 20 degrees C to 70 degrees C ambient
    c. Humidity 0 to 99% relative humidity, non-condensing
    d. Capable of withstanding infinite power interruptions
    e. Surge withstand per ANSI/IEEE C-37.90A-1978
5. Manufacturer shall provide copies of test reports upon request

G. Provide means to remotely monitor switch positions via a data network. See electrical plans for additional requirements. Provide all programming, software and devices. Provide on CD all addressing information for starter, alarm, and functions available for display at future PLC HMI. Manufacturer's Representative shall provide setup assistance during construction. Coordinate with Generator and Data Monitoring Systems Vendors to assure a unified power system

H. Manufacturer:

1. The transfer switch manufacturer shall employ a nationwide factory-direct, field service organization, available on a 24-hour a day, 365 days a year, call basis
2. The Manufacturer shall include an 800-telephone number, for field service contact, affixed to each enclosure
3. The manufacturer shall maintain records of each transfer switch, by serial number, for a minimum 20 years

I. Warranty: Provide Manufacturer's standard full 5-year comprehensive extended coverage service. Warranty shall be "on site" and warranty service shall be available by the factory service department on an emergency basis if required. Depot or non-site warranties are not acceptable

J. Load Bank Controls:

1. Where load bank is required, provide all controls, contactors, and devices needed to exercise generator on load bank. Normal plant loads shall not be on generator during load bank operation of generator
2. Coordinate with Generator Vendor
3. Submit load bank controls data

K. Provide fiber optic connector interface where indicated on plans

L. Where transfer switches are used ahead of main breaker or include main breaker, unit shall be "service rated" and shall have normal service breaker rated for service ampacity

2.03 PROTECTION

A. All equipment installed on this project shall incorporate all devices and features to protect that equipment from the influence of other equipment, line voltage and phase irregularities, harmonics and other disturbances that may affect the proper and safe operation of that equipment whether these required features are a standard component of that equipment as an off-the-line product. No equipment shall be installed without these features

PART 3. EXECUTION

3.01 INSTALLATION

A. Automatic Transfer Switches shall be provided with adequate lifting means for ease of installation of wall or floor mounted enclosures

B. Provide access and working space as indicated or as required per latest edition of National Electrical Code

C. Where Contractor fails to protect automatic transfer switches before and after installation on site and where excessive dust is observed inside the enclosure, the Contractor shall have a factory warranty service technician clean, inspect and test unit, after which the factory shall issue a written and signed statement that full factory is in effect. There are no exceptions to this requirement except to replace entire unit at Engineer’s request

3.02 ADJUSTMENTS

A. Tighten assembled bolted connections with appropriate tools to manufacturer's torque recommendations prior to first energization

3.03 START-UP AND TESTING

A. Provide the services of a Factory Technician to checkout, adjust, set-up, test, and start-up the automatic transfer switch in conjunction with the standby generator. Fully function test the automatic transfer switch to verify proper operation

B. A Factory Technician shall be present for final acceptance testing and shall demonstrate unit operation to Engineer and Owner’s Representative

C. Factory Representative shall demonstrate operation of system to Owner and Engineer

D. Where items are not functional at time of generator start-up, generator manufacturer shall return for additional start-up and testing as required for a complete and thorough demonstration

3.04 TRAINING

A. Provide two (2) 4-hour training courses conducted by Manufacturer’s Representative at a time approved by Owner and Engineer. Provide training outline to Engineer for approval of contents. Notify Engineer of training schedule.

Engineer may be present. Training shall include operation and required owner service and preventative maintenance. Operation and Maintenance Manuals shall be used during training for reference

3.05 WARRANTY

A. Contractor shall provide the Manufacturer's full 5-year comprehensive extended coverage service warranty on the generator installation and shall include all labor and materials required to repair or replace equipment and/or components that are defective or malfunctioning. Included under this warranty shall be all equipment, devices, hardware, and software

B. This warranty shall begin on date of written "Final Acceptance" of the electrical systems and to be executed as required at no additional cost to the Owner. Contractor's warranty shall also guarantee 24-hour service response time and shall provide labor, work, or materials as necessary to maintain plant operation when replacement parts are on order. In no case shall plant electrical systems be out of service for more than 24 hours from time Owner calls for warranty service

C. This shall be provided at no additional cost to the Owner. All equipment and materials installed shall have full warranty from Manufacturer that guarantees equipment is rated for harsh industrial electrical/mechanical environment in which it is installed. Where Manufacturer's products fail prematurely, Manufacturer shall be fully responsible for new replacement and shall not have the option of declaring that failures were caused by environmental conditions and its effect on the product

D. Contractor is fully responsible for assuring that Product Manufacturers are aware of this condition and that warranty statement is included in shop drawing submittals. Failure to do so will be at the Contractor's expense and at no additional cost to the Owner

E. All critical warranted repairs shall be made within 24 hours of receipt of required parts from Manufacturer with reasonable delivery time of overnight shipping. Any repairs not completed within 5 working days from date of notice are subject to Owner making other arrangements for repair and back charging Contractor. This requirement is a condition of this contract

F. Where equipment or instrument problems remain unresolved by Contractor beyond a reasonable time, a Factory Technician shall be provided on-site to take any corrective actions necessary to put equipment or instruments in operating order. Owner and Engineer reserve the right to determine a reasonable time for corrective action by Contractor

END OF SECTION

Section 16410

Enclosed Switches and Circuit Breakers

PART 1. GENERAL

1.01 SUMMARY

A. This specification is confidentially issued for this specific project only

B. Contractor shall be responsible for reading all specifications from all disciplines prior to bid

C. This section covers service disconnects, feeder disconnects, equipment disconnects, and enclosed circuit breakers

1.02 SUBMITTALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

B. Product Data:

1. Submit for switches, circuit breakers, and accessories
2. Descriptive data and time current curves for protective devices and let through current curves for those devices with current limiting characteristics. Include coordination charts and tables, and related data

1.03 RECORD DRAWINGS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

1.04 OPERATIONS & MAINTENANCE MANUALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

1.05 QUALITY ASSURANCE

A. Coordination: Contractor shall determine size, horsepower, voltage, and phase of all equipment to provide/adjust breaker and fused switch size accordingly. Failure to do so will be at expense of contractor at no additional cost to owner

PART 2. PRODUCTS

2.01 OWNER-FURNISHED PRODUCTS

2.02 MANUFACTURER'S

A. Fusible Switches:

1. Eaton
2. Or approved equal

B. Fused Power Circuit Devices:
   1. Eaton
   2. Or approved equal
C. Boltswitch
D. Molded Case Circuit Breakers:
   1. Eaton
   2. Or approved equal
E. Combination Circuit Breaker and Ground Fault Trip:
   1. Eaton
F. Molded Case Current Limiting Circuit Breakers:
   1. Eaton

2.03 ENCLOSED SWITCHES

A. Enclosed Non-fusible Switch: NEMA KS 1, Type HD handle lockable with 2 padlocks
B. Enclosed Fusible Switch, 800 Amperes and Smaller: NEMA KS 1, Type HD, clips to accommodate specified fuses, enclosure consistent with environment where located, handle lockable with two (2) padlocks, and interlocked with cover in CLOSED position
C. Enclosed Fusible Switch Larger Than 800 Amperes: Bolted pressure or high-pressure contact switch, bus drilled to accommodate specified fuses, enclosure consistent with environment where located
   1. Minimum Fault Current Rating: 100,000 symmetrical rms amperes.
D. All enclosures located outdoors or where subject to wet or environmentally harsh locations shall be NEMA 4X 316 stainless steel
E. All switches shall be rated at 600 volts minimum.
F. Handle operator mechanisms shall be on side of enclosure and not on front. Keyed mechanisms that separate handle from breaker mechanism when door is opened are not acceptable

2.04 ENCLOSED CIRCUIT BREAKERS

A. Enclosed Molded Case Circuit Breaker: NEMA AB 1, handle lockable with 2 padlocks
B. Characteristics:
   1. Frame size, trip rating, number of poles, and auxiliary devices as indicated
   2. Interrupting capacity rating to meet available fault current, 10,000 symmetrical rms amperes minimum

3. Appropriate application listing when used for switching fluorescent lighting loads or heating, air conditioning, and refrigeration equipment

C. All enclosures located outdoors or where subject to wet or environmentally harsh locations shall be NEMA 4X 316 stainless steel

2.05 ACCESSORIES

A. Solid state breaker requiring programming unit for settings adjustment

1. Provide new programming unit and all accessories for Owner and Engineers use. Turn over to Engineer for review and testing

B. Original set-up and adjustments shall be performed by the Circuit Breaker Manufacturers Factory Representative

2.06 TRIP UNITS

A. All service and feeder breakers shall have replaceable trip plugs, adjustable, or electric type with adjustable trips

PART 3. EXECUTION

3.01 INSTALLATION

A. Install enclosed switches and circuit breakers in locations as indicated, according to Manufacturer’s written instructions

B. Install enclosed switches and circuit breakers level and plumb

C. Install wiring between enclosed switches and circuit breakers and control/indication devices

D. Connect enclosed switches and circuit breakers and components to wiring system and to ground as indicated and instructed by manufacturer. Tighten connectors and terminals, including screws and bolts according to equipment manufacturer’s published torque tightening values for equipment connectors. Where manufacturer’s torqueing requirements are not indicated, tighten connectors and terminals according to tightening torques specified in UL Standard 486A

3.02 ADJUSTEMENT/CALIBRATION

A. Set field adjustable enclosed equipment trip ranges as recommended by manufacturer

END OF SECTION

Section 16415

Surge Suppression

PART 1. GENERAL

1.01 SUMMARY

A. This specification is confidentially issued for this specific project only

B. Contractor shall be responsible for reading all specifications from all disciplines prior to bid

C. This section describes the requirements for low-voltage AC surge protective devices (SPD's) for various service and electrical equipment

D. All equipment described herein shall be submitted, and factory installed, as an integral part of equipment specified in overall construction documents

1.02 PRICE AND PAYMENT PROCEDURES

A. No separate payment for work performed under this section. Include cost for surge suppression in overall electrical equipment

1.03 REFERENCES

A. This specification references the following publications in their current editions. The publications are referred to in the text by basic designation only

1. DLA MIL-STD-220C: Method of Insertion Loss Measurement
2. IEEE C37.90.1: Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus
3. IEEE C62.41.2: Recommended Practice on Characterization of Surges in Low Voltage (1,000 V and Less) AC Power Circuits
4. IEEE C62.45: Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1,000 V and Less) AC Power Circuits
5. NFPA 70: National Electrical Code (NEC) - Article 285 UL 67: UL Standard for Safety Panelboards
6. UL 845: UL Standard for Safety Motor Control Centers UL 891: UL Standard for Safety Switchboards
7. UL 1283: UL Standard for Safety Electromagnetic Interference Filters
8. UL 1449: UL Standard for Safety Surge Protective Devices
9. UL 1558: UL Standard for Safety Metal-Enclosed Low Voltage Power Circuit Breaker Switchgear
10. UL 67: UL Standard for Safety Panelboards
11. UL 845: UL Standard for Safety Motor Control Centers

12. UL 891: UL Standard for Safety Switchboards
13. UL 1558: UL Standard for Safety Metal-Enclosed Low Voltage Power Circuit Breaker Switchgear
14. All SPDs and their installation shall comply with the requirements of the National Electric Code and Underwriters Laboratories (UL) where applicable
15. Each specified device shall also conform to the standards and codes listed in overall construction documents
16. Refer to general work and all relevant specifications in construction documents for additional requirements and coordination
17. Refer to submittal requirements in other specifications for full requirements
18. Refer to O&M manual requirements in other specifications for full requirements

1.04 SUBMITTALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

B. Submit catalog data for all items supplied from this section as applicable. Submittal shall include at minimum:

1. Cut sheets
2. Functions
3. Ratings
4. Inputs
5. Outputs
6. Displays
7. Dimensional drawings of each SPD type
8. UL 1449 documentation
9. Compliance documentation with Nationally Recognized Testing Laboratory (NRTL)
10. UL 1283 documentation
11. IEEE C62.41.2 and IEEE C62.45, Category C3 (20kV-1.2/50, 10kA-8/20µs waveform) clamping voltage test results
12. All other information required to confirm SPD conforms to all requirements

1.05 OPERATIONS & MAINTENANCE MANUALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

1.06 QUALITY ASSURANCE

A. The manufacturer of this equipment shall have produced similar equipment for a minimum of five (5) years. Engineer may request a list of installations with similar equipment demonstrating qualifications

B. The manufacturer shall be the same manufacturer providing service entrance and distribution equipment where SPD's are to be installed

C. Equipment shall comply and be tested under the UL standards stated in reference section of this specification

D. Manufacturer shall be ISO 9001 or 9002 certified

1.07 SPARE PARTS

A. Provide one surge protective device per installed equipment on project

B. Deliver spare parts to operations and provide signed transmittal form to engineer

C. Lack of transmittal form may require providing additional equipment at no additional cost to owner where supply chain is broken

PART 2. PRODUCTS

2.01 APPROVED SPD TYPE 1 AND TYPE 2 MANUFACTURER'S

A. Eaton

B. General Electric

C. Schneider Electric

D. Allen Bradley

E. Citel

F. Or approved equal

2.02 APPROVED SPD TYPE 3 MANUFACTURER'S

A. EDCO SLAC Series

B. Phoenix Contact

C. Citel

D. Siemens

E. Or approved equal

2.03 SERVICE ENTRANCE RATED EQUIPMENT (TYPE 1)

A. This type applies to switchgear, switchboards, panelboards, motor control centers, and other devices installed as service entrance equipment

B. Where a type 1 SPD installed on service entrance equipment, an additional type 2 SPD shall not be installed unless shown on plans

C. The SPD shall be of the same manufacturer as the electrical equipment installed

D. The SPD shall be integral to the equipment as a factory standardized design

2.04 DISTRIBUTION EQUIPMENT APPLICATIONS (TYPE 2)

A. This type applies to switchgear, switchboards, panelboards, motor control centers, and other devices installed as non-service entrance equipment

B. The SPD shall be of the same manufacturer as the electrical equipment installed

C. The SPD shall be integral to the equipment as a factory standardized design

D. The SPD shall be included and mounted within the equipment by the equipment manufacturer

E. The SPD shall be located within the panelboard, unless otherwise noted in plans

2.05 CONSTRUCTION

A. Overcurrent Protection: The unit shall contain thermally protected metal-oxide varistors (MOVs). The thermally protected MOVs shall have a thermal protection element packaged together with the MOV in order to achieve overcurrent protection of the MOV. The thermal protection element shall disconnect the MOVs from the system in a fail-safe manner should a condition occur that would cause them to enter a thermal runaway condition.

B. Maintenance Free Design: The SPD shall be maintenance free and shall not require any user intervention throughout its life. SPDs containing items such as replaceable modules, replaceable fuses, or replaceable batteries are not acceptable. SPDs requiring any maintenance of any sort such as periodic tightening of connections are not acceptable.

C. Balanced Suppression Platform: The surge current shall be equally distributed to all MOV components to ensure equal stressing and maximum performance. The surge suppression platform must provide equal impedance paths to each matched MOV. Designs incorporating replaceable SPD modules are not acceptable.

D. Electrical Noise Filter: Each unit shall include a high-performance EMI/RFI noise rejection filter. Noise attenuation for electric line noise shall be up to 50 dB from 10 kHz to 100 MHz using the DLA MIL-STD-220C insertion loss test method.

E. Local Monitoring: Visible indication of proper SPD connection and operation shall be provided. The indicator lights shall indicate which phase as well as which module is fully operable. The status of each SPD module shall be monitored on the front cover of the enclosure as well as on the module. A push-to-test button shall be provided to test each phase indicator. Push-to-test button shall activate a state change of dry contacts for testing purposes.

F. Surge Counter: The SPD shall indicate user how many surges have occurred at the location. The surge counter shall trigger each time a surge event with a peak current magnitude of a minimum of 50 ± 20A occurs. A reset pushbutton shall also be standard, allowing the surge counter to be zeroed. The reset button shall contain a mechanism to prevent accidental resetting of the counter via a single, short-duration button press. To prevent accidental resetting, the surge counter reset button shall be depressed for a minimum of 2 seconds in order to clear the surge

count total. The ongoing surge count shall be stored in nonvolatile memory or UPS backup.

G. Remote Monitoring: For remote monitoring, the SPDs shall provide the same discrete and analog signal and control functions as specified for local monitoring and the surge counter, to a terminal strip for outgoing connection to a PLC as shown on the Plans. The functions shall be converted as specified for interface to the monitored equipment.

H. The voltage surge suppression system shall incorporate thermally protected metal-oxide varistors (MOVs) as the core surge suppression component for the service entrance and all other distribution levels. The system shall not utilize silicon avalanche diodes, selenium cells, air gaps, or other components that may crowbar the system voltage leading to system upset or create any environmental hazards.

I. SPD shall be listed in accordance with UL 1449 and UL 1283

J. Integrated surge protective devices (SPD) shall be Component Recognized in accordance with UL 1449, Section 37.3.2 and 37.4 at the standard's highest short circuit current rating (SCCR) of 200 kA, including intermediate level of fault current testing.

K. SPD shall be tested with the ANSI/IEEE Category C High exposure waveform (20kV-1.2/50µs, 10kA-8/20µs).

L. SPD shall provide suppression for all modes of protection: L-N, L-G, and N-G in WYE systems (7 Mode).

2.06 RATINGS

A. Unit operating voltage: Refer to plans for operating voltage equipment and unit configuration

B. SPD shall be designed to withstand a maximum continuous operating voltage (MCOV) of not less than 115% of nominal RMS voltage measured on site

C. Minimum surge current rating shall be 240kA per phase (120kA per mode) for service entrance and 120kA per phase (60kA per mode) for distribution applications

D. Pulse life test: Capable of protecting against and surviving 5000 ANSI/IEEE category C high transients without failure or degradation of clamping voltage by more than 10%

E. Minimum UL 1449 withstand nominal discharge current (In) rating to be 20kA per mode

F. UL 1449 clamping voltage must not exceed the following: Voltage Protection Rating (VPR)

Voltage	**L-N**	**L-G**	**N-G**
204/120	1200/800V	800V	800V
208Y/120	800V	800V	800V

480Y/277	1200V	1200V	1200V
600Y/347	1500V	1500V	1500V

PART 3. EXECUTION

3.01 INSTALLATION

A. All equipment specified herein shall be factory installed, field adjusted, tested, and cleaned as an integral part of equipment specified in other equipment specification

B. Type 1 and 2 SPD's shall be grounded and bonded as a part of the individual equipment as specified in the individual equipment specifications

C. Type 3 shall be grounded and bonded in accordance with the SPD manufacturer's instructions

D. All monitoring and diagnostic features shall be visible from the front of the equipment

E. Provide and install a fully integrated component design: All SPD's components and diagnostics shall be contained within one discrete assembly

F. SPD's or individual SPD modules that must be ganged together to achieve higher surge current ratings

G. Furnish nameplates for each SPD as shown on plans

3.02 SERVICE ENTRANCE RATED EQUIPMENT (TYPE 1)

A. Service entrance located SPD's shall be tested and demonstrate suitability for application within IEEE C26.41.2 category C environments

B. Locate the SPD on the load side of the main disconnect device, as close as possible to the phase conductors and the ground/neutral bars

C. The SPD shall be connected through a UL approved disconnecting means. The disconnect shall be located in immediate proximity to the SPD

D. Connection shall be made via electrical bus, conductors, or other connections originating in the SPD and shall be kept as short as possible

3.03 DISTRIBUTION EQUIPMENT APPLICATIONS (TYPE 2)

A. Service entrance located SPD's shall be tested and demonstrate suitability for application within IEEE C26.41.2 category B environments

B. SPD's shall be installed immediately following the load side of the main breaker

C. SPD's installed in main lug only panelboards shall be installed immediately following the incoming main lugs

3.04 INDIVIDUAL EQUIPMENT PROTECTION (TYPE 3)

A. Locate the SPD on the load side of the ground and neutral connections

B. The SPD shall be connected through a UL approved disconnecting means. The disconnect shall be located in immediate proximity to the SPD

3.05 ADJUSTEMENT/CALIBRATION

A. Coordinate stabilized voltage levels within the project boundaries and provide product voltage rated equipment appropriate to avoid overvoltage

3.06 MAINTENANCE/WARRANTY

A. The manufacturer shall warrant the equipment to be free from defects in material and workmanship for ten (10) years from date of substantial completion

B. Within such period of warranty, the manufacturer shall promptly furnish all material and labor necessary to return the equipment to new operating condition

C. Any warranty work requiring shipping or transporting of the equipment shall be performed by the manufacturer at no expense to owner

END OF SECTION

Section 16438

Panelboards

PART 1. GENERAL

1.01 SUMMARY

A. This specification is confidentially issued for this specific project only

B. Contractor shall be responsible for reading all specifications from all disciplines prior to bid

C. Section Includes: Lighting and power panelboards and associated auxiliary equipment rated 600 V or less

1.02 REFERENCES

A. A. Institute of Electrical and Electronic Engineers (IEEE):

1. IEEE C62.1 - Standard for Gap Silicon-Carbide Surge Arrestors for AC Power Circuits

B. IEEE C62.11 - Standard for Metal-Oxide Surge Arrestors for AC Power Circuits

C. National Electrical Manufacturers Association (NEMA):

1. NEMA PB.1 - Panelboards.
2. NEMA PB1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 volts or less

D. Underwriter's Laboratory (UL):

1. UL 486A Wire Connectors and Soldering Lugs for Use with Copper Conductors, 7th Edition
2. UL 870 - Wireways, Auxiliary Gutters, and Associated Fittings, 5th Edition

1.03 SUBMITTALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

B. Product Data:

1. For each type panelboard, accessory item, and component specified.
2. Identification materials.

C. Shop Drawings:

1. Dimensioned plans, sections, and elevations.
2. Tabulations of installed devices, major features, and voltage rating.

3. Include:

a. Enclosure type with details for types other than NEMA Type 1

D. b. Bus configuration and current ratings.

E. c. Short circuit current rating of panelboard.

F. d. Features, characteristics, ratings, and factory settings of individual protective devices and auxiliary components

G. Wiring diagrams detailing schematic diagram including control wiring, and differentiating between manufacturer installed and field- installed wiring

H. Report of field tests and observations in accordance with this section

I. Maintenance and Operations Data: Include instructions for testing circuit breakers

PART 2. PRODUCTS

2.01 MANUFACTURER'S

A. Schneider

B. Eaton

C. General Electric

D. Or Equal

2.02 PANELBOARDS

A. Panelboards shall have voltage, overcurrent devices and features as indicated

B. Breakers shall be bolt-in type, trip-free. Multipole breakers shall be provided with a common internal trip which opens all poles simultaneously and with a single operating handle for all poles. Handle ties between breakers are not acceptable

C. Breakers for 480V distribution panels shall be rated at least 14000 amps I.C., and breakers for 120/240V panels shall be rated at least 10,000 amps I.C.

D. Provide copper ground bus inside each cabinet

E. Enclosures shall be NEMA 4X 316 stainless steel surface mounted cabinet with gasketed, hinged door, inside gutter trim and with door mounted directory pocket.

F. Electrical panels shall have tinned or silver-plated copper bus

G. Construction in accordance with NEMA PB1

H. Overcurrent Protective Devices (OCPD's):

1. Provide type, rating, and features as indicated
2. Tandem circuit breakers shall not be used
3. Multi-pole breakers shall have common trip

I. Enclosures: Cabinets, enclosures, and panels, flush or surface mounted as indicated. NEMA Type 12 enclosure shall be use indoors, except where other enclosure requirements are indicated on drawings. All outdoor enclosures shall be NEMA 4X stainless steel. This includes indoor locations such as wastewater process areas and environmentally harsh locations

J. Front:

1. Secure to box with concealed trim clamps except as indicated
2. Front for surface mounted panels shall be same dimensions as box
3. Fronts for flush panels shall overlap box except as otherwise specified

K. Directory Frame: Metal, mounted inside each panel door

L. Bus: Hard drawn copper of 98 percent conductivity

M. Main and Neutral Lugs: Mechanical type

N. Equipment Ground Bus: Adequate for feeder and branch circuit equipment ground conductors. Bonded to box

O. Service Equipment Approval: Listed for use as service equipment for panelboards having main service disconnect

P. Provision for Future Devices: Equip with mounting brackets, bus connections, and necessary appurtenances, for the OCPD ampere ratings indicated for future installation of devices

Q. Special Features: Provide following features for panelboards as indicated

1. Isolated Equipment Ground Bus: Adequate for branch circuit equipment ground conductors; insulated from box
2. Split Bus: Vertical bus of indicated panels divided into two vertical sections with connections as indicated
3. Extra Gutter Space: Dimensions and arrangement as indicated
4. Auxiliary Gutter: Conform to UL 870
5. Column Type Panelboard Configuration: Narrow cabinet extended as wireway to overhead junction box equipped with ground and neutral terminal buses
6. Sub-feed: OCPD or lug provision as indicated
7. Feed Through Lugs: Sized to accommodate feeders indicated
8. Surge Arresters: For panelboards as indicated on Plans
   a. Comply with IEEE C62.11 or IEEE C62.1
   b. Description: Coordinate impulse sparkover voltage with system circuit voltage and provide factory mounting with UL recognized mounting device

2.03 LOAD CENTERS

A. Provide load center type panelboards only where specifically indicated

B. OCPD’s: Plugin full module (nominal 1in. width) circuit breaker

C. Circuit Breakers for Switching Lights at Panelboards: Indicated type SWD

D. Circuit Breakers for Equipment Marked HCAR Type: Indicated HCAR type

E. Interiors: Provide physical means to prevent installation of more OCPD's than quantity for which enclosure was listed

F. Main, Neutral, and Ground Lugs and Buses: Mechanical connectors for conductors

2.04 LIGHTING AND APPLIANCE BRANCH CIRCUIT PANELBOARDS

A. Branch OCPD's: Bolton circuit breakers, replaceable without disturbing adjacent units

B. Doors: In panel front, with concealed hinges. Secure with flush catch and tumbler lock, all keyed alike

2.05 DISTRIBUTION PANELBOARDS

A. Branch Circuit Breakers: Where OCPD's are indicated to be circuit breakers, use bolt on breakers except circuit breakers 225ampere frame size and greater may be plugin type where individual positive locking device requires mechanical release for removal

B. Doors:

1. In panel front, omit single panelboard door in cabinet front for fusible switch panelboards except as indicated

2. Secure with vault type with tumbler lock, all keyed alike

2.06 ACCESSORY COMPONENTS AND FEATURES

A. Accessory Set: Include tools and miscellaneous items as required for overcurrent protective device test, inspection, maintenance, and operation.

B. Portable Test Set: Arranged to permit testing of functions of solid-state trip devices without removal from panelboard

C. Spare Fuse Cabinet: Identified, compartmented, lockable steel box or cabinet with compartments suitable for surface mounting on wall

D. All equipment, instruments and devices provided for this project shall have means of protection from power line conditions such as surge, phase fail, or other line conditions that may damage equipment, instruments or devices furnished. It is vendors and manufacturers' responsibility to provide protective devices as required for maintaining warranty of furnished items and to assure no damage occurs from power line conditions

2.07 IDENTIFICATION

A. General: Provide nameplates for all panelboards.

B. Panelboard Nameplates: Engraved laminated plastic for each panelboard.

2.08 SOURCE QUALITY CONTROL

PART 3. EXECUTION

3.01 TESTING

A. Perform tests on low voltage power panelboards and accessories

B. Upon completing installation of system, perform following tests:

1. Make insulation resistance tests of panelboard buses, components, and connecting supply, feeder, and control circuits
2. Make continuity tests of circuits

C. Quality Control Program

1. Procedures: Make field tests and inspections and prepare panelboard for satisfactory operation in accordance with manufacturer's recommendations and these specifications
2. Notify Engineer at least one week in advance of testing
3. Report Testing:
    a. Report written reports of tests and observations
    b. Report defective materials and workmanship and unsatisfactory test results
    c. Include records of repairs and adjustments made
4. Protective Device Ratings and Settings:
    a. Verify indicated ratings and settings to be appropriate for final system configuration and parameters
    b. Where discrepancies are found, recommend final protective device ratings and settings
    c. Use accepted ratings or settings to make final system adjustments

D. Visual and Mechanical Inspection: Include following inspections and related work:

1. Inspect for defects and physical damage, labeling, and nameplate compliance with requirements of up to date drawings and panelboard schedules
2. Exercise and perform operational tests of all mechanical components and other operable devices in accordance with manufacturer's instruction
3. Check panelboard mounting, area clearances, and alignment and fit of components
4. Check tightness of bolted electrical connections with calibrated torque wrench. Refer to manufacturer's instructions for proper torque values
5. Perform visual and mechanical inspection and related work for overcurrent protective devices as within this section

E. Electrical tests: Include following items performed in accordance with manufacturer's instruction:

1. Insulation resistance test of buses and portions of control wiring that disconnected from solid state devices. Insulation resistance less than 100 megohms is not acceptable

2. Ground resistance test on system and equipment ground connections
3. Test main and sub-feed overcurrent protective devices in accordance within this section

F. Retest: Correct deficiencies identified by tests and observations and provide retesting of panelboards. Verify by system tests that total assembly meets specified requirements

3.02 CLEANING

A. Upon completion of installation, inspect interior and exterior of panelboards

B. Remove paint splatters and other spots, dirt, and debris

C. Touch up scratches and mars of finish to match original finish

D. Clean interior of panelboard

3.03 ADJUSTING

A. Adjust doors and operating mechanisms for free mechanical movement

3.04 COMMISSIONING

A. Balancing Loads: After Substantial Completion, but before Final Acceptance, conduct load balancing measurements and circuit changes as follows:

1. Perform measurements during period of normal working load as advised by Owner
2. Perform load balancing circuit changes outside the normal occupancy/working schedule of the facility. Make special arrangements with Owner to avoid disrupting critical 24hr services such as Fax machines and online data processing, computing, transmitting, and receiving equipment
3. Recheck loads after circuit changes during normal load period. Record load readings before and after changes and submit test records
4. Tolerance: Difference between phase loads exceeding 20 percent at any one panelboard is not acceptable. Re-balance and recheck as required to meet this minimum requirement

3.05 INSTALLATION

A. General: Install panelboards and accessory items in accordance with NEMA PB 1.1, and manufacturers' written installation instructions, and approved submittals

B. Mounting Heights: Top of trim 6 ft 2in. above finished floor, except as indicated

C. Mounting:

1. Plumb and rigid without distortion of box
2. Mount flush panels uniformly flush with wall finish

D. Circuit Directory: Typed and reflective of final circuit changes required to balance panel loads. Obtain approval before installing

E. Install filler plates in unused spaces

F. Provision for Future Circuits at Flush Panelboards:

1. Stub four 1inch empty conduits from panel into accessible ceiling space or space designated to be ceiling space in future

2. Stub four 1inch empty conduits into raised floor space or below slab other than slabs on grade

G. Auxiliary Gutter: Install where a panel is tapped to a riser at an intermediate location

H. Wiring in Panel Gutters: Train conductors neatly in groups, bundle, and wrap with wire ties after completion of load balancing

3.06 GROUNDING

A. Connections: Make equipment grounding connections for panelboards as indicated

B. Provide ground continuity to main electrical ground bus indicated

3.07 CONNECTIONS

A. A. Tighten electrical connectors and terminals, including grounding connections, in

B. accordance with manufacturer’s published torque- tightening values. Where manufacturer’s torque values are not indicated, use those specified in UL 486A.

END OF SECTION

Section 16441

Pilot & Control Devices

PART 1. GENERAL

1.01 SUMMARY

A. This specification is confidentially issued for this specific project only

B. Contractor shall be responsible for reading all specifications from all disciplines prior to bid

C. This section includes pilot and control devices for instrumentation and control system

D. Products listed are applicable where shown on plans or required by other specifications or manufacturer's

1.02 SUBMITTALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

PART 2. PRODUCTS

2.01 TAGGING

A. Provide Type 316 stainless steel tag on field-mounted units and permanently affix tag to unit

B. Include Engineer's tag number where listed in Control Diagrams

2.02 PUSHBUTTONS/SELECTOR SWITCH/PILOT LIGHTS

A. Manufacturers:

1. Square D Class 9001, Type K
2. Eaton
3. Allen Bradley 800T
4. Or, pre-approved equal

B. Construction:

1. Heavy duty
2. Liquid tight
3. Oil tight
4. Base mounting
5. Flush panel mounting

6. Size to mount in 30.5 mm diameter opening without adapter. Smaller units are not acceptable
7. Padlock attachments, where required, constructed of metal. Plastic material is not acceptable
8. Legend plates, as required, for type of operation or as specified elsewhere

C. Pushbuttons:

1. Flush head unless specified elsewhere.
2. Contact Blocks:
    a. Double break silver contacts
    b. AC Ratings: 7,200 VA make, 720 VA break
    c. Single pole, double throw or double pole, single throw
    d. Up to six (6) tandem blocks
3. Maintained contact unless specified elsewhere
4. Non-illuminated.
5. Legend plates, as required, for type of operation or as specified elsewhere

D. Selector Switches:

1. Maintained position unless specified elsewhere
2. Contact Blocks:
    a. Double break silver contacts
    b. AC Rating: 7,200 VA make, 720 VA break
    c. Single pole, double throw or double pole, single throw
    d. Up to six (6) tandem blocks
3. Operators:
    a. a. Number of positions as specified elsewhere
    b. b. Standard knob type unless specified elsewhere

E. Pilot Lights:

1. LED, high visibility type
2. Colored lenses as specified elsewhere
3. Interchangeable lenses
4. Push to test
5. Legend plates as specified elsewhere

F. Enclosures:

1. Mounted in control or instrument panel as specified elsewhere
2. Control Station:

a. Environment:
   i. NEMA 12 in general areas
   ii. NEMA 4X 316 stainless steel in wet locations or outdoors
b. Flush or surface mounted as specified elsewhere.
   i. Provide flush mounted pull box.

G. Nameplates:

1. Control Stations:
   a. Engraved laminated plastic
   b. Letters 3/16 in. high
   c. White letters on black background
   d. Identify per equipment controlled

2.03 MOTOR STARTER CONTROL RELAYS

A. Manufacturers:
   1. Square D
   2. Eaton
   3. Or pre-approved equal

B. Construction:
   1. Industrial type
   2. 300 V rated
   3. AC operation
   4. Pressure wire connectors

C. Operating Data:
   1. Pickup Time: 11 ms maximum
   2. Dropout Time: 6 ms maximum

D. Coil:
   1. Molded construction
   2. 120 VAC, 60 Hz
   3. Continuous rated
   4. Color coded to indicate status
   5. Pilot duty
   6. 60A make, 6A break, (120 V inductive)

E. Contacts:
   1. Double break
   2. Silver alloy

3. Convertible
4. Color coded to indicate status
5. Pilot duty
6. 60A make, 6A break, (120V inductive)

F. Track mounting capability

G. Accessories:

1. Add-on pole attachment:
   a. 4 NO and 4 NC contacts
   b. Add-on to 0 to 4 pole relays
2. Latch attachment.
3. Pneumatic Timer Attachment:
   a. Single pole, double throw, double break timed contact
   b. Adjustable 0.2 to 60 sec
   c. Repeat accuracy of + 15 percent
   d. Convertible timing mode
4. Transient Timing Mode: Suppress coil transients to 300 V or less

H. All relays to be 4PDT type

2.04 CONTROL RELAYS

A. Manufacturers:

1. Potter and Brumfield
2. Struthers Dunn
3. Or pre-approved equal

B. B. Operating Data:

1. Pickup Time: 13 ms maximum
2. Dropout Time: 10 ms maximum.
3. Operating Temperature: -45 o C to 70 o C

C. AC Coil:

1. 120 or 240 Va
2. Continuous rated
3. 3.5 VA inrush
4. 1.2 VA sealed
5. 50 to 60 Hz
6. Minimum Dropout Voltage: 10% of coil rated voltage

D. DC Coil:

1. 24 or 120 Vdc
2. Continuous rated
3. Minimum Coil Resistance
   a. 24 Vdc: 450 ohm
   b. 120 Vdc: 9,000 ohm

E. Contacts:

1. Silver cadmium oxide for 1 amp or less resistive load
2. Gold flashed fine silver; gold diffused
3. 4 Form C
4. 120 VAC
5. 20 amp make, 1.5-amp break (inductive)

F. Rated at 10 million operations

G. Plug-in sockets

H. Enclosed and protected by polycarbonate cover

I. Provide relay retaining clips

J. All relays to be 4PDT type

2.05 TIME DELAY RELAY

A. ATC # 319D-016, with 2 SPDT switches rated 5 amps at 120 Volt, contacts and coil, plug in base and socket, 5 ranges, .02 seconds to 30 minutes.

B. AGASTAT #7022AC, Instantaneous open on energization, time delay close on de-energization. Time range 1.5 seconds to 15 seconds, 120-volt, 60 Hz

C. ATC Model #319D-134, with 2 S.P.D.T. switches rated 5 Amps at 120 Volt, contacts and coil, plug in base and socket, 3 ranges, .1 to 100 seconds.

D. Macromatic Industrial Controls, Model #TAA1U, with two (2) S.P.D.P. switches rated 3 amps at 250-volt contacts, 24-240VAC/DC coil, plug-in base, six (6) functions, sixteen (16) ranges, 0.5 seconds to 10 hours.

E. Or approved equal

2.06 ELAPSED TIME METER

A. Manufacturers:

1. Cramer #635G/HRS.
2. Digits: Five (5), non-resettable.
3. Power: 120 VAC, 60 Hz.

B. Manufacturers:

1. Cramer #635S surface mounted.
2. Digits: Five (5), non-resettable
3. Power: 120 VAC, 60 Hz

2.07 TIMERS

A. 24 Hour Clock Timer (Repeat Cycle):
   1. Manufacturers:
      a. Tork Time Controls
      b. Intermatic
      c. Or pre-approved equal
   2. Mounting: Surface
   3. Display: 24-hr LCD
   4. Contacts: One (1) SPDT rated 20A
   5. Set Points: 288 per 24 hr.
   6. Skip Feature: 1 to 7-day adjustable
   7. Minimum On-Off Time: 5 min.
   8. Time cycle programmable by keypad
   9. Power: 120 VAC, 60 Hz

B. Interval/Duration Timer:
   1. Manufacturers: ATC or equal.
   2. Mounting: Plug-in with dust tight cover
   3. Type: Integrated circuit
   4. Range: As indicated on drawings
   5. Contacts: Two (2) DPDT contacts rated 10 amp
   6. Power: 120 VAC, 60 Hz

2.08 ALTERNATOR

A. Manufacturers:
   1. Diversified Electronics:
      a. Two (2) Pump Duplexor:
         i. 24 VAC/DC, ARA-24-ABA.
         ii. 48 VDC, ARA-48-ABA
         iii. 120 VAC/DC, ARA-120-ABA
         iv. 208 VAC, ARA-208-ABA
         v. 240 VAC, ARA-240-ABA
      b. Three (3) Pump Triplexor:

i. 24 V, ARA-24-AFE
ii. 120 V, ARA-120-AFE

c. Four (4) Pump Quadraplexor:
i. 24 V, ARA-24-AGE
ii. 120 V, ARA-120-AGE

d. Two (2)/Three (3) Pump Duplexor/Triplexor: 120 V, ARA-120-AME
e. Three (3)/Four (4) Pump Triplexor/Quadraplexor: 120 V, ARA-120-ANE
f. Five (5)-Pump Pentaplexor: 120 V, ARP-100
g. Six (6)-Pump Hexaplexor: 120 V, ARA-100

2. Time Mark Corporation: 120 V, B 471
3. Macromatic Industrial Controls: Two (2) pump duplexor, 120 volt, ARP120A6, 240 volts, ARP240A6
4. Or approved equal

B. Provide automatic alternation of energizing motor starters

C. Permit operation of units singly or together as called by pilot devices

D. N.O. auxiliary contacts from motor starters required to operate alternator

E. Alternator shall provide for operation of standby or lag unit through second pilot device in event of failure of lead unit or first pilot device or alternator coil

F. With pump selector switch for operation of two (2), three (3), four (4) and five (5) pump systems

2.09 PHASE FAIL RELAY

A. Diversified Electronics #SLD-440-ALE, 480 Volt, 3 Phase

B. Diversified Electronics #SLD-220-ALE, 240 Volt, 3 Phase

C. Macromatic Industrial Controls, #PMDU, 208-480 Volt, 3 Phase

2.10 ROTATED BEACON

A. Manufacturers:

1. Edwards: LED 105XBRM Series XTRA-BRITETM LED – RED 120VAC NEMA 4X

2.11 EXTERIOR MOUNTED ALARM HORN

A. Manufacturers:

1. Edwards
2. Or, pre-approved equal

B. 120 VAC

C. Suitable for use in wet location, gasketed.

D. Cabinet mounted, provide mounting lugs. Body to include outlet box.

E. Aluminum mounting hood.

F. ¾ inch conduit hubs

2.12 INTRUSION SWITCHES

A. Doors:

1. On all entrance doors for alarm switch and, on MCC and control panel doors for intrusion or light operation, install Model E700, DPDT switch as manufactured by ERSCE except where shown otherwise on plans

2. Micro Switch, applicable model, where indicated on plans.

3. Special Applications:

a. Where indicated on Plans for loose fitted doors and/or for areas where subject to damage, install GRI Model 4400 magnetic switches with stainless steel cable

B. Overhead Rollup Doors:

1. For overhead door applications, install ADEMCO Model 958-2 Magnetic OHD Contractor, or approved equal

2.13 SUBMERSIBLE PUMP PROTECTION MODULE

A. Flyght MiniCAS II: Model No. 83 58 57 (24 volt), 40-50 10 98 (120 volt); MiniCAS II/FUS Model No. 14-40 71 13 92 (24 volt)

B. Module shall be capable of monitoring temperature via a thermal switch embedded in motor winding, and capable of detecting leakage via sensor located in pump

C. Temperature detection to operate Form “C” 10-amp contact, such that when wired into pump controls will shut down pump when over-temperature condition is detected

D. Leakage detection to operate Form “C” 10-amp contact, such that when wired into pump controls will initiate alarm

E. 20-30 VAC, 50-60 Hz with 24-volt external power supply, or 120 VAC, 5-60 control power source

F. LED indicators for over-temperature and leak indications.

G. Manual reset pushbutton to interrupt power supply.

H. Model No. 14-50 70 97 Socket

I. Temperature Range: 0-50° C (32-123° F), Max 90% RH

2.14 VOLTAGE TRANSDUCER

A. Manufacturer:

1. Ohio Semitronics, Inc.
2. Or, approved equal

B. A.C. Voltage Transducer Model VT rated per circuit maximum voltage x 1.25. Select version that matches shown on plans

C. Transducer to be rated for 125% of current rating

2.15 UNIVERSAL AC CURRENT SENSOR

A. Manufacturer:

1. Entrelec, SSAC, Inc. – P.O. Box 1000, Baldwin, NY, 13027
2. Or, approved equal

B. TSC, ECS, ECSH, and ECSL Series: Provides relay contact closure when current reaches pre-set level

C. Install per Manufacturer's instructions

D. Sensor to be rated at 125% of current rating

2.16 CURRENT TRANSDUCER

A. A. Manufacturers:

1. HCS
   a. Model: CR4170 Series
   b. Output: 4-20 ma or 0-5 VDC, as required
   c. Three (3) element AC current.
   d. Calibration: True RMS sensing.
   e. Temperature Range: 0 to 50 degrees Celsius.
2. NK Technologies
3. Ohio Semitronics, Inc.
4. Or, approved equal

B. AT Series: Current transformer with signal conditioner. Split or solid core as applicable. 420 model with 4–20 MA output. Self-powered. 0 – 200-amp range. U.L. listed

C. A.C. Current Transformer Model No. MCT5, 005E or 005E2 (as shown on plans) with Manufacturer's recommended CT rated per circuit maximum amps x 1.25

D. AT/ATR Series: 0 – 200-amp range or, as required by motor current rating

E. Transducer to be rated for 125% of voltage rating

F. Size unit to detect peak inrush current of motor

2.17 PANEL GAUGES

A. Provide front flange, flush, panel mounted 6-inch diameter and with lower back mount type

B. Range:

1. Water Pressure: 0 to 150 psi
2. Ground Storage Tank Level: 0 to 50 feet
3. Other measured parameter range plus 25 percent

C. Accuracy: 1 percent or better

D. Manufacturers:

1. Marshal town
2. Or approved equal

2.18 MULTIPLE CHANNEL ISOLATED SWITCH

A. Manufacturer: Diversified Electronics.

B. Model: ISO and ISL Series.

C. Contacts: SPST-N.O. per channel.

D. Temperature Range: -4° F to 135° F.

E. LED indicators for each output.

2.19 IMPEDANCE MATCHING TRANSFORMER (NOT USED)

2.20 DC/DC CONVERTER (NOT USED)

2.21 SIGNAL CONVERTER/ISOLATION AMPLIFIER (NOT USED)

PART 3. EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's written instructions, applicable requirements of NEC, NECA "Standard of Installation," and recognized industry practices.

B. Control Relay:

1. Install panel control relays in I&C panel.
2. Install motor starter control relays in MCC and wherever more rugged type relay required

END OF SECTION

Section 16460

Low-Voltage Transformer

PART 1. GENERAL

1.01 SUMMARY

A. This specification is confidentially issued for this specific project only

B. Contractor shall be responsible for reading all specifications from all disciplines prior to bid

C. General Purpose, Dry Type Transformers.

D. Drive Isolation Transformers.

E. Control and Signal Transformers.

F. Mini Power Zone Packaged Power Supply

1.02 REFERENCES

A. American National Standards Institute, Inc. /Institute of Electrical and Electronics Engineers (ANSI/IEEE):

1. ANSI/IEEE C2 - National Electrical Safety Code
2. ANSI/IEEE C57.12.80 Standard Terminology for Power and Distribution Transformers

B. National Electrical Manufacturers Association (NEMA):

1. NEMA LA 1 - Surge Arresters
2. NEMA ST 1 - Specialty Transformers (Except General-Purpose Type)
3. NEMA ST 20 - Dry-Type Transformers for General Applications

C. Underwriters Laboratories, Inc. (UL):

1. UL 486A- Wire Connectors and Soldering Lugs for Use with Copper Conductors
2. UL 506 – Specialty Transformers

1.03 SUBMITTALS

A. Product Data:

1. Dimensional plans and sections
2. Elevations showing minimum clearances
3. Installed devices
4. Materials list
5. Weights

6. Wiring diagrams
7. Manufacturer's nameplate data and electrical ratings

B. Product Test Reports:

1. Certified copies of manufacturer's design and routine factory tests required by reference standards
2. Submit after manufacture of transformer and before installation

PART 2. PRODUCTS

2.01 MANUFACTURER'S

A. Square D

B. General Electric

C. Or equal

2.02 GENERAL TRANSFORMERS

A. Transformers:

1. Factory-assembled and tested, air-cooled units of types specified, having characteristics and ratings as indicated
2. Design unit for 60 Hz service

B. Cores: Grain-oriented, non-aging silicon steel

C. Coils: Continuous windings without splices, except for taps

D. Internal Coil Connections: Brazed or pressure type

E. Bolt coil/core to bottom of enclosure for transformers larger than 15 kVA

1. Isolated by rubber, vibration-absorbing mounts
2. Metal-to-metal contact between coil/core and enclosure not allowed

F. Provide copper windings.

G. Nameplates: Provide metal nameplate listing manufacturer's name, serial number, type, class, kVA voltage, frequency, and showing internal wiring diagram.

H. Sound Level: Minimum 3 dB less than sound levels for transformer type and size indicated when factory-tested in accordance with NEMA ST 20

I. Enclosures at wastewater treatment plant outdoor or chemical area locations to be NEMA 4X stainless steel

2.03 DRY-TYPE TRANSFORMERS

A. Dry-type transformers shall have continuous KVA and voltage characteristics as shown

B. Enclosures shall be 316 stainless steel

C. Copper coils shall be provided with NEMA standard taps in high voltage windings

D. Furnish Square D or equal dry-type transformers

E. Comply with NEMA ST 20.

F. Windings: 2-winding type. 3-phase transformers shall use 1 coil/ phase in primary and secondary

G. Transformers shall have following features and ratings.

1. Enclosure: Indoor, ventilated unless otherwise shown on plans, outdoor, weatherproof unless shown otherwise on plans
2. Insulation Class: 185 o C or 220 o C class for transformers 15 kVA or smaller; 220 o C class for transformers larger than 15 kVA
3. Insulation Temperature Rise: 80 o C maximum rise above 40 o C for 15 kVA and larger; 115 o C maximum rise above 40 o C below 15 kVA
4. Taps: For transformers 3 kVA and larger, full capacity taps in high voltage winding as follows
   a. 3 through 10 kVA: Two 5% taps below rated high voltage.
   b. 15 through 500 kVA: Six 2-1/2% taps, 2 above and 4 below rated high voltage
   c. 750 through 1,000 kVA: Four 2-1/2% taps, 2 above and 2 below rated high voltage

H. Accessories: Following accessory items are required where shown on Drawings

1. Surge Arresters: Low voltage type, factory-installed and connected to high voltage terminals; complying with NEMA LA 1
2. Wall Mounting Brackets: Manufacturer’s standard brackets for transformers sized up to 75 kVA where wall mounting indicated
3. Electrostatic Shielding: Insulated metallic shield between primary and secondary windings. Connect to terminal marked shield” for grounding connection, where applicable

2.04 DRIVE ISOLATION TRANSFORMERS

A. Comply with requirements of NEMA ST 1 and UL 506, except as specified below

B. Ratings:

1. As indicated and continuous duty
2. Minimum kVA: 130% of motor nameplate hp

C. Type:

1. Self-cooled, 2-winding, dry type especially designed for application, with special coil bracing to withstand electro-mechanical forces involved
2. 3-ph transformers shall use 1 coil/phase in primary and secondary

D. Transformers shall have following features and ratings

1. Enclosure: Indoor, ventilated unless otherwise shown on Drawings
2. Insulation Class: 220 o C class
3. Insulation Temperature Rise: 115 o C at 115% of rating
4. Taps: Two 5% full capacity taps, 1 above and 1 below rated high voltage
5. Temperature Sensing Device: Thermistor embedded in coil with leads brought out to terminal board

2.05 CONTROL AND SIGNAL TRANSFORMERS

A. Comply with NEMA ST 1 and UL 506

B. Ratings:

1. As indicated and for continuous duty
2. Where rating not indicated, provide 250 percent of load

C. Type: Self-cooled, 2-winding dry type

D. Enclosure: Indoor, except as indicated

2.06 MINI POWER ZONE PACKAGED POWER SUPPLY

A. Provide with primary breaker, transformer, secondary breaker, and circuit breaker panel as indicated on plans

B. Enclosure shall be NEMA 4X for outdoor and wet area indoor use, NEMA 3R for dry outdoor use, NEMA 1 for dry indoor use, and NEMA 12 for dusty indoor use. Provide stainless steel enclosure where shown on plans

C. Unit shall be rated for maximum full load temperature rise of 115°C

PART 3. EXECUTION

3.01 PREPERATION

A. Temporary Heating: Comply with manufacturer’s written recommendations within enclosure of each transformer throughout periods during which equipment is not in a space continuously under normal control of temperature and humidity

3.02 INSTALLATION

A. Arrange equipment to provide adequate spacing for cooling air circulation

B. Tighten electrical connectors and terminals in accordance with manufacturer's published torque-tightening values. Where manufacturer's torque values not indicated, use those specified in UL 486A and 486B

C. Install wall-mounted transformers on prefabricated brackets designed for purpose

D. Install floor-mounted transformers on 4-in. concrete housekeeping pad

E. Touch up scratched or marred surfaces to match original finish

F. Identify transformers as specified herein.

G. Install lightning arresters as shown on Drawings.

3.03 GROUNDING

A. Ground in accordance with Section 16452 – "Grounding."

B. Ground secondary transformers with separate driven ground rod.

3.04 FIELD QUALITY CONTROL

A. Test and permanently record as follows.

1. Prior to energization of transformers, test phase-to-phase and phase-to-ground insulation resistance levels

2. Test transformers for continuity of circuits and short-circuits

3.05 ADJUSTING

A. Adjust transformer taps to provide optimum voltage conditions at utilization equipment

3.06 CLEANING

A. Upon completion of installation, inspect interiors and exteriors of accessible components

1. Remove paint splatters and other spots, dirt, and construction debris

2. Touch up scratches and mars of finish to match original

END OF SECTION

Section 16622

Sound Attenuating Enclosure

PART 1. GENERAL

1.01 SUMMARY

A. This specification is confidentially issued for this specific project only

B. Contractor shall be responsible for reading all specifications from all disciplines prior to bid

C. Contractor shall contact local Factory Representative to verify all equipment purchased conforms to the requirements of this project. Failure to do so may result in equipment removal and replacement at Contractor's expense

D. This section specifies furnishing and installing a weatherproof sound attenuating enclosure around the standby emergency power generator

1.02 SUBMITTALS

A. Refer to specification for Basic Submittal and O&M Requirements 16051

B. Submit all products covered under this specification for Engineer's approval.

C. Submit the following information to the Engineer for approval prior to placing any equipment on order:

D. Dimensional Drawings. Submit dimensional drawings of the sound attenuating enclosure and accessories.

E. Test Report. Furnish a certified copy of the factory test report on the actual enclosure provided.

F. With each submittal, include a copy of the applicable specification(s) page(s) for the item submitted and mark "Complies" or "Non-Compliance" or "Exception" adjacent to the applicable paragraph. Identify applicable drawing sheet number and specification section on front of each submittal cover.

PART 2. PRODUCTS

2.01 GENERAL

A. The overall acoustical performance shall reduce the noise levels to 78 dB at 23 feet, as required by local ordinances, or as shown on plans.

B. Adjust concrete pad size accordingly to accommodate enclosure.

C. Wall construction and cooling baffle or silence construction shall be independently tested in conformance with ASTM procedures C423 for sound absorption, E90 for transmission loss, E413 for sound transmission class and E477 for silencer acoustical performance (Dynamic Insertion Loss).

D. In addition to these minimum acoustical performance numbers, the enclosure shall meet the following fire related parameters per NFPA No. 255 or ASTM E84. Flame spread = 15, smoke developed = 0, and fuel contributed = 0.

E. General enclosure design shall be able to withstand the following loadings: 120 mph winds, 42 lbs. /ft. Roof loads

F. All enclosures are to be constructed from high strength galvanneal.

G. The enclosure shall be finish coated with powder baked paint for superior finish, durability, and appearance. Enclosures will be finished in the manufacturer's standard color.

H. The enclosures must allow the generator set to operate at full load in an ambient temperature of 40 - 45°C with no additional derating of the electrical output.

I. Enclosures must be equipped with sufficient side and end doors to allow access for operation, inspection, and service of the unit and all options. Minimum requirements are two doors per side. When the generator set controller faces the rear of the generator set, an additional rear facing door is required. Access to the controller and main line circuit breaker must meet the requirements of the National Electric Code.

J. Doors must be hinged with stainless steel hinges and hardware and be removable.

K. Doors must be equipped with lockable latches. Locks must be keyed alike.

L. A duct between the radiator and air outlet must be provided to prevent re-circulation of hot air.

M. The complete exhaust system shall be internal to the enclosure

2.02 CONSTRUCTION

A. General construction of the enclosure walls and roof shall consist of dual wall, prefabricated tongue-and-groove type acoustic panels with a 16 gauge, galvanized steel outer skin: a 22 gauge, perforated galvanized steel inner skin; roll formed internal channel stiffers and framing; and 3 lbs/cu. ft. density mineral glass fiber acoustical/ thermal insulation completely filling the void between the inner and outer skins. Included shall be a 2 mil mylar protective liner installed between the perforated inner skin and the insulation material. An acoustical labyrinth shall be achieved at each panel joint or seam.

B. The enclosure’s super structure will consist of a structural rectangular tube framework. The structure shall consist of two full length base members, six full width base members, four full height corner columns, and two full width roof beams. This structure shall be completely seal welded at each connection point and all open tube ends will be capped with seal welded plates. Lifting eyes rated at a safe working load of 8,000 pounds each (for units that weigh more than 6,000 pounds) or 6,000 pounds each (for units that weigh less than 6,000 pounds) shall be installed at the top of each structural tube steel corner column. Anchor bolt clips shall be located and installed along the inside perimeter of the structural tube steel base frame.

C. All doors will be factory mounted in a separate, self-supporting, welded steel frame. All door hardware will be factory mounted. Door hardware to include 316 stainless steel refrigeration type slam locks with exit bar, two-point slam and take-up locks with inside release handle ball bearing heavy duty hinges, and positive type stainless steel door holders. Doors shall have neoprene or EPDM perimeter gasketing. Door shall seal completely along gasketed perimeter.

D. Acoustical treatment of the cooling air intake and discharge opening shall be achieved with straight-through type, full height vertical baffles. Each baffle shall be of a one-piece construction.

E. Construction of each baffle shall include a galvanized steel frame and stiffeners, perforated galvanized steel skin, roll-formed galvanized steel end caps, and acoustical insulation completely filling the void between the perforated skins. Each baffle must be easily removable to allow for completely open ends. Removal of the baffles shall not affect structural integrity of the enclosure. The baffles shall be located within the overall length of the enclosure's walls and roof. Silencers mounted externally from the enclosure are not acceptable.

F. In addition to the cooling air intake/discharge openings being acoustically treated, a set of 6" deep stationary weather louvers with bird screens shall be supplied. These louvers shall be mounted to the enclosure's structural tube steel frame at each end of the enclosure. Louvers are to be removable and have lifting eyes to aid in removal.

G. Vent fan forced air ventilation with T-STAT and switch, interior lighting with switch, and GFI W.P. receptacle shall be provided and connected to a 12 circuit (minimum) NEMA 1 surface mounted lighting panel complete with 60AT/2P main breaker, (12) 20A (or, as required for loads) plug-in circuit breakers and 15 kVA (or, as shown on plans) encapsulated 480/120-240 volt transformer, located in the enclosure. Contractor to provide feeder circuit from Motor Control Center/Control Panel.

H. Provide approved concrete or steel stairs with landing where required for access from grade level. Provide shop drawings for Engineer's approval.

I. No penetrations shall be made through walls, floor, or top of enclosure by anyone other than the Manufacturer or, unless specifically authorized by Engineer, in writing, after detailed drawing has been submitted. This includes penetrations for fuel lines and conduits. Any unauthorized holes may result in replacement of entire enclosures.

J. All fuel lines to engine are to enter via underground 4-inch Schedule 80 PVC sleeve or via floor through, as indicated on plans. No exceptions.

2.03 MANUFACTURERS

A. Engine & Compressor Accessories (EC&A)

B. Generator Manufacturer

C. Or approved equal.

PART 3. EXECUTION

3.01 TESTING

A. Perform sound level measurements with a calibrated sound level instrument and demonstrate readings in presence of Engineer and Owner's Representative. Record readings on plans and elevation drawing for Owner's record.

3.02 INSTALLATION

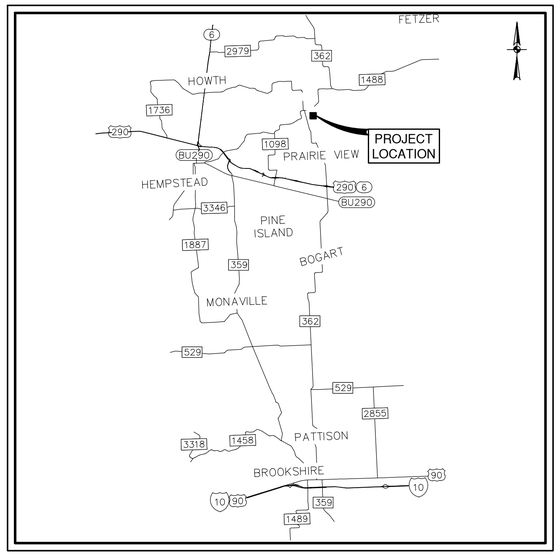
A. Install sound attenuation enclosure as shown in construction documents

END OF SECTION

WATER PLANT NO. 2 CDBG IMPROVEMENTS

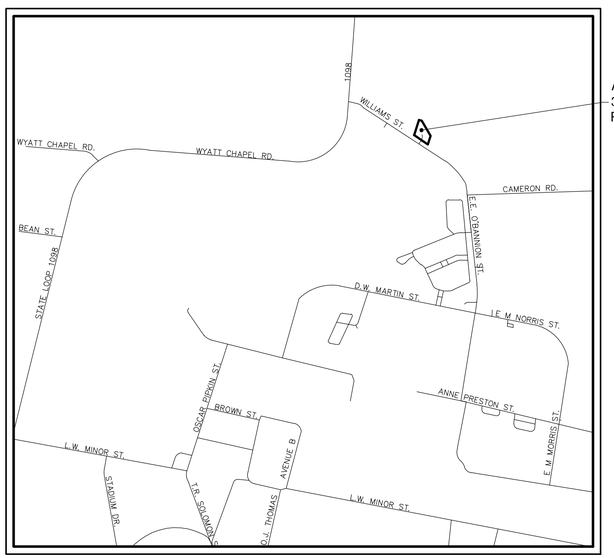
CITY OF PRAIRIE VIEW, WALLER COUNTY, TEXAS

CIVIL CONSTRUCTION PLANS



LOCATION MAP

NOT-TO-SCALE



Approximate Location
36132 Cameron Rd,
Prairie View, TX

VICINITY MAP

NOT-TO-SCALE

COUNTY JUDGE: CARBETT "TREY" J. DUHON III

PCT. 1 JOHN A. AMSLER
PCT. 2 WALTER E. SMITH
PCT. 3 KENDRIC D. JONES
PCT. 4 JUSTIN BECKENDORFF

THE STATE OF TEXAS
WALLER COUNTY

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APPROVED
CITY OF PRAIRIE VIEW

Signed by:
F06D1D3A61F9436...
MAYOR

APPROVED
WALLER COUNTY

Signed by:
FB37A5230EA6465...
J. Ross McCall, P.E.
COUNTY ENGINEER

JULY 2026

PAPE-DAWSON
2107 CITYWEST BLVD, 3RD FLR I HOUSTON, TX 77042 I 713.428.2400
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

Know what's below.
Call 811 before you dig.

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED
PROFESSIONAL ENGINEER
7/7/2026

PD JOB NO. 42241-00 WATER PLANT NO. 2 CDBGIMPROVEMENT

Date: July 6, 2026, 12:33 PM User ID: Iherris File: K:\Projects\42241\01 - Generator\03 CAD\2-0 Design\2-1 Civil\2-1-4 Plans\Sheets\42241-00_Cover.dwg

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GENERAL NOTES

1. THESE PLANS WERE PREPARED TO MEET OR EXCEED THE MINIMUM REQUIREMENTS OF THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ). THE DESIGN IS CONSISTENT WITH THE MINIMUM STANDARDS ESTABLISHED IN THE LATEST ISSUE OF THE CITY OF HOUSTON'S "INFRASTRUCTURE DESIGN MANUAL" AND "GROUNDWATER PLANT DESIGN GUIDELINES
2. WASTEWATER COLLECTION SYSTEMS, WATER LINES, STORM DRAINAGE, AND STREET PAVING SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CITY OF HOUSTON, HOUSTON PUBLIC WORKS' STANDARD CONSTRUCTION SPECIFICATIONS AND DETAILS (MOST RECENT ISSUE), WITH ALL SUBSEQUENT AMENDMENTS ADDED THERETO, UNLESS OTHERWISE NOTED AND APPROVED ON THESE PLANS.

3. ALL MATERIALS INSTALLED ON THIS PROJECT SHALL COMPLY WITH THE CITY OF HOUSTON'S APPROVED PRODUCTS LIST.

4. ALL WORK SHALL BE COMPLETED TO THE SATISFACTION OF THE CITY OF PRAIRIE VIEW, TCEQ, WALLER COUNTY, AND THE ENGINEER. ALL WORK IS SUBJECT TO INSPECTION BY THE CITY OF PRAIRIE VIEW, TCEQ, WALLER COUNTY, AND THE ENGINEER OR HIS DESIGNEE.

5. THESE PLANS, PREPARED BY PAPE DAWSON, DO NOT EXTEND TO OR INCLUDE DESIGNS OR SYSTEMS PERTAINING TO THE SAFETY OF THE CONTRACTOR OR ITS EMPLOYEES, AGENTS, OR REPRESENTATIVES IN THE PERFORMANCE OF THE WORK. THE SEAL OF THE REGISTERED PROFESSIONAL ENGINEER(S) HEREON DOES NOT EXTEND TO ANY SUCH SAFETY SYSTEM(S) THAT MAY BE NECESSARY IN THE CONTRACTOR'S COMPLETION OF THE WORK. CONTRACTOR SHALL PROVIDE APPROPRIATE SAFETY SYSTEMS IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL LAWS INCLUDING, BUT NOT LIMITED TO, OSHA AND ALL PROPOSED OSHA RULES AND REGULATIONS.

6. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL APPLICABLE PERMITS PRIOR TO COMMENCEMENT OF CONSTRUCTION.

7. CONTRACTOR SHALL NOTIFY SARAH ALMASRI (713-428-2400), 48 HOURS PRIOR TO BEGINNING ANY CONSTRUCTION.

8. ALL EXISTING UTILITIES AND IMPROVEMENTS REPRESENTED ON THESE PLANS ARE SHOWN AT THE APPROXIMATE LOCATIONS BASED ON THE BEST AVAILABLE INFORMATION. SOME OF THE EXISTING ABOVE- AND BELOW-GROUND IMPROVEMENTS SHOWN HEREON MAY NOT HAVE BEEN FIELD VERIFIED. CONTRACTOR SHALL VERIFY THEIR LOCATION AND ELEVATION PRIOR TO COMMENCEMENT OF CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL DAMAGES CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND MAINTAIN THESE FACILITIES. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPORT ANY DISCREPANCIES TO OWNER OR ENGINEER IN A TIMELY MANNER.

9. THESE PLANS MAY NOT SHOW ALL OF THE UNDERGROUND TELEPHONE, ELECTRICAL, GAS SERVICE, OR CABLE TELEVISION LINES. LOCATION OF THESE LINES IS THE RESPONSIBILITY OF THE CONTRACTOR. CONTRACTOR SHALL NOTIFY ONE-CALL (811) AT LEAST 48 HOURS BEFORE PROCEEDING WITH ANY EXCAVATION.

10. CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGE TO EXISTING PUBLIC OR PRIVATE UTILITY LINES AND OTHER IMPROVEMENTS INCLUDING, BUT NOT LIMITED TO, PAVING, WATER LINES, WASTEWATER COLLECTION SYSTEMS, STORM SEWERS, TRAFFIC SIGNALS, LANDSCAPING, SIDEWALKS, AND FENCES DURING CONSTRUCTION. AL LDAMAGES SHALL BE REPAIRED TO THEIR ORIGINAL CONDITION AT NO COST TO THE OWNING AUTHORITY.

11. CONTRACTOR SHALL UNCOVER EXISTING UTILITIES AT ALL POINTS OF CROSSING WITH PROPOSED UNDERGROUND LINES TO DETERMINE IF CONFLICTS EXIST BEFORE BEGINNING ANY CONSTRUCTION. CONTRACTOR SHALL NOTIFY THE ENGINEER AT ONCE OF ANY CONFLICTS. CONTRACTOR SHALL NOT MAKE ANY FIELD MODIFICATIONS WITHOUT PRIOR APPROVAL OF THE ENGINEER.

12. CONTRACTOR SHALL CONFINE ALL WORK EFFORTS WITHIN THE DESIGNATED AREA, UNLESS SPECIFICALLY AUTHORIZED BY THE OWNER. EXTREME CARE SHOULD BE EXERCISED NEAR ADJACENT PROPERTY TO PROTECT ANY EXISTING TREES, FENCES, LANDSCAPING, SIDEWALKS, AND OTHER FEATURES.

13. ALL UNSATISFACTORY AND/OR WASTE MATERIALS, INCLUDING EXCESS SPOIL, VEGETATION, ROOTS, AND CONCRETE/CONSTRUCTION DEBRIS, SHALL BE HAULED OFF SITE AND LEGALLY DISPOSED OF BY THE CONTRACTOR IN A MANNER NOT TO CAUSE DAMAGE TO THE OWNER. RECYCLING OF CONSTRUCTION WASTE IS ENCOURAGED WHERE FEASIBLE. THIS WILL BE CONSIDERED INCIDENTAL TO THE VARIOUS OTHER ITEMS OF WORK.

14. CONTRACTOR SHALL MAINTAIN ADEQUATE DRAINAGE AT ALL TIME DURING CONSTRUCTION OF THE PROPOSED IMPROVEMENTS. ANY DRAINAGE DITCH OR STRUCTURE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THE SATISFACTION OF THE OWNING AUTHORITY. THIS SHALL INCLUDE TURF ESTABLISHMENT FOR ANY DISTURBED AREAS.

15. ALL AREAS PROPOSED TO BE EXCAVATED, FILLED, OR OTHERWISE DISTURBED IN ANY FASHION ARE TO FIRST BE STRIPPED (MINIMUM OF 6 INCHES) OF ALL GRASS AND TOPSOIL. ALL AREAS TO RECEIVE FILL SHALL BE PROOF-ROLLED. FILL MATERIAL SHALL BE PLACED ONLY ON PROPERLY CLEARED AND PREPARED AREAS (SCARIFY TO PRODUCE A GOOD BOND WITH THE FILL LIFT). ALL WET AREAS SHALL BE MUCKED-OUT TO THE DEPTH DETERMINED BY THE GEOTECHNICAL CONSULTANT.

16. ALL FILL AND BACKFILL MATERIAL SHALL BE PLACED IN MAXIMUM 8-INCH LOOSE LIFTS AND COMPACTED TO 95% STANDARD PROCTOR DENSITY WITHIN 2 PERCENTAGE POINTS OF OPTIMUM MOISTURE CONTENT (AMERICAN SOCIETY OF TESTING MATERIALS (ASTM) D698).

17. DELIVERY TICKETS FOR ALL MATERIALS (E.G. CONCRETE, CEMENT-STABILIZED SAND, ETC.) SHALL BE MAINTAINED BY THE CONTRACTOR AND, UPON REQUEST, BE MADE AVAILABLE FOR REVIEW BY THE ENGINEER.

18. ANY CONSTRUCTION WHICH HINDERS TRAFFIC OR REQUIRES TRAFFIC DIVERSION SHALL BE IN ACCORDANCE WITH THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES. INCLUDE FLAGMEN AS REQUIRED TO CONTROL TRAFFIC FOR MATERIAL AND OR EQUIPMENT DELIVERIES. CONTRACTOR IS RESPONSIBLE FOR PREPARING AND OBTAINING AGENCY APPROVAL FOR ALL TRAFFIC CONTROL PRIOR TO IMPLEMENTING SAME.

19. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONTACT THE TESTING LABORATORY TO HAVE THE LAB PRESENT DURING PLACEMENT OF ALL BACKFILL, PLACEMENT OF ANY FILL, OR ANY OTHER REQUIRED LAB TESTING.

20. THE ONLY PERSON(S) AUTHORIZED TO ADD WATER TO CONCRETE TRUCKS ARE REPRESENTATIVES OF THE ENGINEER OR TESTING LAB.

21. ALL CEMENT STABILIZED SAND USED ON THIS PROJECT SHALL BE MINIMUM 2SACKS OF CEMENT PER TON OF DRY SAND.

GENERAL NOTES (CONT.)

22. CONTRACTOR IS RESPONSIBLE FOR ALL POLLUTION PREVENTION PLAN ITEMS IN THIS CONTRACT. ANY FINES INCURRED AS A RESULT OF MISAPPLICATION OR NEGLIGENCE FROM THE CONTRACTOR WILL BECOME THE RESPONSIBILITY OF THE CONTRACTOR FOR PAYMENT (INCLUDING RESULTING OWNER'S FINE(S), IF ANY).

23. ALL CONTRACTOR VEHICLES, INCLUDING EMPLOYEE'S VEHICLES, SHALL PARK WITHIN THE PROJECT SITE TO MINIMIZE TRAFFIC ON THE PUBLIC STREETS ADJACENT TO THE WORK SITE ENTRANCE. CONTRACTOR WILL PROVIDE SUFFICIENT PARKING AREAS TO ACCOMMODATE HIS VEHICLES. ANY AREAS DISTURBED OR DESTROYED BY VEHICULAR PARKING WILL BE REPAIRED TO ORIGINAL CONDITION PRIOR TO COMPLETION OF THE PROJECT.

24. CONTRACTOR SHALL COORDINATE THE WORK WITH THE UTILITY OWNER / DISTRICT OPERATOR. CONTRACTOR IS NOT PERMITTED TO OPERATE ANY EXISTING UTILITY VALVES UNLESS NECESSITATED BY EMERGENCY.

25. THE CONDITION OF ADJACENT ROADS AND/OR RIGHTS-OF-WAY, UPON COMPLETION OF THE PROJECT, SHALL BE AS GOOD OR BETTER THAN THE CONDITION PRIOR TO STARTING WORK.

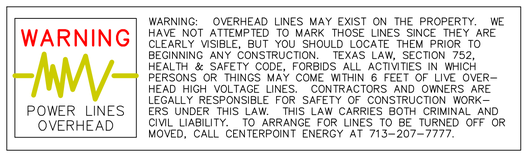
26. UPON PROJECT COMPLETION, AND PRIOR TO FINAL RELEASE OF RETAINAGE, CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS OF THE "PROJECT RECORD DOCUMENTS" SECTION OF THE CONTRACT DOCUMENTS.

27. PRIOR TO FINAL RELEASE OF RETAINAGE, CONTRACTOR SHALL PROVIDE A NOTARIZED CERTIFICATION THAT ALL MATERIALS INSTALLED IN THE PROJECT ARE COMPLETE IN PLACE IN ACCORDANCE WITH APPROVED PLANS AND SPECIFICATIONS AND A COMPLETE SET OF AS-BUILT DRAWINGS.

WALLER COUNTY CONSTRUCTION NOTES

1. WALLER COUNTY MUST BE INVITED TO THE PRE-CONSTRUCTION MEETING PER SECTION "5.1A WALLER COUNTY SUBDIVISION AND DEVELOPMENT REGULATIONS".
2. CONTRACTOR SHALL NOTIFY WALLER COUNTY ENGINEERING DEPARTMENT 48 HOURS PRIOR TO COMMENCING CONSTRUCTION AND 48 HOUR NOTICE TO ANY CONSTRUCTION ACTIVITY WITHIN THE LIMITS OF THE PAVING AT ENGINEERINGINSPECTION@WALLERCOUNTY.US .
3. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED FROM WALLER COUNTY PRIOR TO COMMENCING CONSTRUCTION OF ANY IMPROVEMENTS WITHIN COUNTY ROAD RIGHTS OF WAY.
4. ALL PAVING IMPROVEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH "WALLER COUNTY SUBDIVISION & DEVELOPMENT REGULATIONS"RELATING TO THE APPROVAL AND ACCEPTANCE OF IMPROVEMENTS IN SUBDIVISIONS AS CURRENTLY AMENDEDALL.
5. ROAD WIDTHS, CURB RADII, AND CURB ALIGNMENTS SHOWN INDICATE BACK OF CURB.
6. A CONTINUOUS LONGITUDINAL REINFORCING BAR SHALL BE USED IN THE CURBS.
7. ALL CONCRETE PAVEMENT SHALL BE 5 1/2 SACK CEMENT WITH A MINIMUM COMPRESSIVE STRENGTH OF 3500 PSI AT 28 DAYS. STRUCTURAL CONCRETE SHALL HAVE A 28-DAY COMPRESSIVE STRENGHT OF 4000 PSI. TRANSVERSE EXPANSION JOINTS SHALL BE INSTALLED AT EACH CURB RETURN AND AT A MAXIMUM SPACING OF 60 FEET WITH A MAXIMUM 20 FEET DISTANCE BETWEEN SAW CUTS. REBAR TIED 50% ON 18°O.C. AND 100% ON 24°O.C.
8. CONCRETE SURFACE TREATMENT -BRUSH FINISH.
9. ALL WEATHER ACCESS TO ALL EXISTING STREETS AND DRIVEWAYS SHALL BE MAINTAINED AT ALL TIMES.
10. 4" X 1 2" REINFORCED CONCRETE CURB SHALL BE PLACED IN FRONT OF SINGLE-FAMILY LOTS ONLY. ALL OTHER AREAS SHALL BE 6" REINFORCED CONCRETE CURB WITH STIRUPS ON 18°CENTERS.
11. CURB HEADERS ARE REQUIRED AT CURB CONNECTIONS TO HANDICAP RAMPS, WITH NO CONSTRUCTION JOINT WITHIN 5' OF RAMPS.
12. GUIDELINES ARE SET FORTH IN THE TEXAS "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", AS CURRENTLY AMENDED, SHALL BE OBSERVED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ADEQUATE FLAGMEN, SIGNING, STRIPING AND WARNING DEVICES, ETC., DURING CONSTRUCTION - BOTH DAY AND NIGHT.
13. ALL R1-1 STOP SIGNS SHALL BE A MINIMUM OF 36" X 36" WITH DIAMOND GRADE SHEETING PER TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
14. SIGN POSTS AND SIGNS ARE TO BE INSTALLED PER WALLER COUNTY APPROVED SIGNAGE DESIGN DRAWINGS.
15. STREET NAME SIGNAGE SHALL BE ON A 9'HIGH SIGN FLAT BLADE W/REFLECTIVE GREEN BACKGROUND. STREET NAMES SHALL BE UPPER AND LOWERCASE LETTERING WITH UPPERCASE LETTERS OF 6" MINIMUM AND LOWERCASE LETTERS OF 4.5" MINIMUM. THE LETTERS SHALL BE REFLECTIVE WHITE. STREET NAME SIGNS SHALL BE MOUNTED ON STOP SIGN POST.
16. A BLUE DOUBLE REFLECTORIZED BUTTON SHALL BE PLACED AT ALL FIRE HYDRANT LOCATIONS. THE BUTTON SHALL BE PLACED 12 INCHES OFF OF THE CENTERLINE OF THE STREET ON THE SAME SIDE AS THE HYDRANT.
17. THE PROJECT AND ALL PARTS THEREOF SHALL BE SUBJECT TO INSPECTION FROM TIME TO TIME BY INSPECTORS DESIGNATED BY WALLER COUNTY. NO SUCH INSPECTIONS SHALL RELIEVE THE CONTRACTOR OF ANY OF ITS OBLIGATIONS HEREUNDER. NEITHER FAILURE TO INSPECT NOR FAILURE TO DISCOVER OR REJECT ANY OF THE WORK AS NOT IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS . REQUIREMENTS AND SPECIFICATIONS OF WALLER COUNTY OR ANY PROVISION OF THIS PROJECT SHALL BE CONSTRUED TO IMPLY AN ACCEPTANCE OF SUCH WORK OR TO RELIEVE THE CONTRACTOR OF ANY OF ITS OBLIGATIONS HEREUNDER.
18. STABILIZED SUBGRADE: DETERMINE THE THICKNESS OF THE STABILIZED SUBGRADE AFTER CURING AND COMPACTION. IF THE SUBGRADE DEPTH IS GREATER THAN THE PROPOSED THICKNESS BY 20% OR MORE. THE CMT LAB MUST PROVIDE VERIFICATION THE PERCENTAGE OF MATERIAL BEING USED TO STABILIZE THE SUBGRADE MEETS OR EXCEEDS PROJECT REQUIREMENTS. TEST RESULTS REQUIRED

NOTE: WALLER COUNTY NOTES SUPERSEDE ANY CONFLICTING NOTES.



WARNING: OVERHEAD LINES MAY EXIST ON THE PROPERTY. WE HAVE NOT ATTEMPTED TO MARK THOSE LINES SINCE THEY ARE CLEARLY VISIBLE, BUT YOU SHOULD LOCATE THEM PRIOR TO BEGINNING ANY CONSTRUCTION. TEXAS LAW, SECTION 752, HEALTH & SAFETY CODE, FORBIDS ALL ACTIVITIES IN WHICH PERSONS OR THINGS MAY COME WITHIN 6 FEET OF LIVE OVERHEAD HIGH VOLTAGE LINES. CONTRACTORS AND OWNERS ARE LEGALLY RESPONSIBLE FOR SAFETY OF CONSTRUCTION WORKERS UNDER THIS LAW. THIS LAW CARRIES BOTH CRIMINAL AND CIVIL LIABILITY. TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED, CALL CENTERPOINT ENERGY AT 713-207-7777.

NO.	REVISION	DATE



PAPE-DAWSON
2107 CITYWEST BLVD. 3RD FLR I HOUSTON, TX 77042 I 713.426.2400
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

WATER PLANT NO. 2 CDBG IMPROVEMENTS
CITY OF PRAIRIE VIEW, TEXAS
GENERAL
CONSTRUCTION NOTES

PLAT NO.
JOB NO. 42241-00
DATE FEBRUARY 2025
DESIGNER SMA
CHECKED JWL DRAWN LDH
SHEET 2 OF 13

G2

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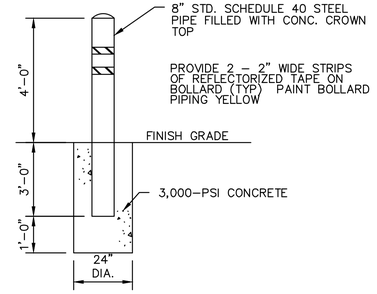
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SCALE: 1"= 10'

0 10' 20' 30'

BOUNDARY COORDINATE			
POINT	NORTHING	EASTING	PROP. ELEV.
1	243498.82	1163460.79	EDGE OF CONCRETE
2	243487.36	1163464.35	EDGE OF CONCRETE



TYPICAL BOLLARD DETAIL
N.T.S.

NO.	REVISION	DATE

STATE OF TEXAS
JOHN W. LACY
90202
LICENSED PROFESSIONAL ENGINEER
5/21/2025

PAPE-DAWSON
2107 CITYWEST BLVD, 3RD FLR I HOUSTON, TX 77042 I 713.426.2400
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

WATER PLANT NO. 2 CDBG IMPROVEMENTS
CITY OF PRAIRIE VIEW, TEXAS
PROPOSED SITE PLAN

PLAT NO.
JOB NO. 42241-00
DATE FEBRUARY 2025
DESIGNER SMA
CHECKED JWL DRAWN LDH

SHEET 3 OF 13

C1

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PLAN LEGEND

	EQUIPMENT CONNECTION
J	JUNCTION OR CONNECTION BOX
LC	STARTER OR LIGHTING CONTACTOR
	DISCONNECT SWITCH
MH	MANHOLE
HH	HANDHOLE
#	KEYED NOTE. NUMBER MATCHES NOTE NUMBER
$	TOGGLE SWITCH, WALL MOUNTED, SINGLE POLE SINGLE THROW. MOUNTED 54 IN. AFF. UNLESS OTHERWISE NOTED.
$4	TOGGLE SWITCH, WALL MOUNTED, FOUR WAY. MOUNTED 54 IN. AFF. UNLESS OTHERWISE NOTED.
$M	SWITCH MOTOR RATED WITH TERMINAL OVERLOADS
OS	OCCUPANCY SENSOR
	TERMINAL BOARD
	TELEPHONE OUTLET, PRIVATE. MOUNTED 12 IN. AFF.
	DATA OUTLET, SURFACED MOUNTED
#	MOTOR LOAD, NUMBER INDICATES HORSEPOWER
	POLE
	TRANSFORMER , DRY TYPE, KVA RATING MAY BE DISPLAYED NEXT TO SYMBOL
	ANTENNA
###	HOMERUN, LETTERS INDICATE PANELBOARD, NUMBERS INDICATE CIRCUIT NUMBER IN PANELBOARD
E	CONDUIT CAPPED FOR FUTURE USE
E	CONDUIT GOING DOWN
E	CONDUIT GOING UP
	CONDUIT ABOVE GROUND
E	CONDUIT RUN UNDERGROUND OR CONCEALED
	CONDUIT RUN BELOW CONCRETE
	LIQUID TIGHT FLEXIBLE CONDUIT
	SURFACE MOUNT
	120V RECEPTACLE FLUSH MOUNTED
	120V RECEPTACLE SURFACE MOUNTED
	120V QUAD RECEPTACLE FLUSH MOUNTED
	120V QUAD RECEPTACLE SURFACE MOUNTED
	208V RECEPTACLE FLUSH MOUNTED
	208V RECEPTACLE SURFACE MOUNTED
	WELDING OUTLET
T	THERMOSTAT
	PANELBOARD FLUSH MOUNTED
	PANELBOARD SURFACE MOUNTED
	NORTH ARROW
TS	TORQUE SWITCH
SV	SOLENOID SWITCH
LS	LIMIT SWITCH
AS	AMMETER SWITCH
VS	VOLTMETER SWITCH
PS	PRESSURE SWITCH
LC	LIGHTING CONTACTOR
PC	PHOTOCELL

GROUNDING LEGEND

	A=GROUNDING RECEPTACLE; B=GROUND TEST WELL
B	BARE COPPER GROUNDING CONDUCTOR
	GROUNDING CONNECTION
	COPPER CLAD GROUND ROD

ONE-LINE AND CONTROL SCHEMATIC LEGEND

	GROUND CONNECTION
	NORMALLY OPEN RELAY OR CONTACTOR CONTACTS
	NORMALLY CLOSED RELAY OR CONTACTOR CONTACTS
	CONDUCTOR CONNECTION
TEXT	CIRCUIT BREAKER, MOLDED CASE, TRIP CURRENT AND QUANTITY OF POLES (P) SHOWN NEXT TO SYMBOL
TEXT	DISCONNECT SWITCH NON-FUSED, LOAD BREAK. CONTINUOUS CURRENT RATING, QUANTITY OF POLES (P) SHOWN NEXT TO SYMBOL
TEXT	DISCONNECT SWITCHED FUSED, LOAD BREAK. CONTINUOUS CURRENT RATING, QUANTITY OF POLES (P), AND FUSE RATING SHOWN NEXT TO SYMBOL
TEXT	FUSE. RATING SHOWN NEXT TO SYMBOL
	MOTOR STARTER THERMAL OVERLOAD PROTECTOR
CR##	CONTACTOR OR RELAY COIL. LETTERS AND NUMBERS MATCH CONTACTS CONTROLLED
	LIMIT SWITCH NORMALLY CLOSED
	LIMIT SWITCH NORMALLY OPEN
	MOTOR OPERATED VALVE GEARED LIMIT SWITCH
	PRESSURE SWITCH NORMALLY CLOSED OPEN ON INCREASING PRESSURE
	PRESSURE SWITCH NORMALLY OPEN CLOSES ON INCREASING PRESSURE
	LEVEL SWITCH NORMALLY CLOSED OPEN ON INCREASING LEVEL
	LEVEL SWITCH NORMALLY OPEN CLOSES ON INCREASING LEVEL
	FLOW SWITCH NORMALLY CLOSED OPENS WITH FLOW
	FLOW SWITCH NORMALLY OPEN CLOSES ON PRESENCE OF FLOW
	SPACEHEATER
ØF	PHASE FAILURE RELAY
START STOP	MAINTAINED CONTACT START/STOP PUSHBUTTON
OFF HAND AUTO AUTO HAND	MAINTAINED CONTACT HAND-OFF-AUTO SELECTOR SWITCH
	NORMALLY CLOSED MOMENTARY CONTACT PUSHBUTTON
	NORMALLY OPEN MOMENTARY CONTACT PUSHBUTTON

WYE	WYE TRANSFORMER CONNECTION
DELTA	DELTA TRANSFORMER CONNECTION
CT ###:#	CURRENT TRANSFORMER WITH RATIO SHOWN
AIT	ANALYTICAL TRANSMITTER
FS	FLOW OR FLOAT SWITCH
LT	LEVEL TRANSMITTER
PT	PRESSURE TRANSMITTER
SV	SOLENOID VALVE
MOV	MOTOR OPERATED VALVE
TD 0-10 MIN. TOE	TIME DELAY RELAY. TIMES OUT AFTER ENERGIZATION. ADJUSTABLE TIME DELAY TIME INDICATED NEXT TO SYMBOL.
TD 0-10 MIN. TOD	TIME DELAY RELAY. TIMES OUT AFTER DE-ENERGIZATION. ADJUSTABLE TIME DELAY TIME INDICATED NEXT TO SYMBOL.
XXX###	CONDUIT TAG
?	PILOT LIGHT. R=RED, B=BLUE, G-GREEN, A=AMBER, Y=YELLOW
480V 120V	CONTROL POWER TRANSFORMER. PRIMARY AND SECONDARY VOLTAGE INDICATED
PT	CPT = CONTROLS POWER/INSTRUMENT TRANSFORMER
15 KVA 480V 120/240V	PT = POWER TRANSFORMER. VOLTAGE AND KVA RATING AS SHOWN
TV	TELEVISION CAMERA
TQ	TORQUE SWITCH
A	AMMETER
V	VOLTMETER
LA	LIGHTING ARRESTOR
CAP	SURGE CAPACITOR
	INSTALLED OUTSIDE OF PANEL
	MOUNTED ON INNER PANEL
	CONTROL PANEL TERMINAL STRIP
MCP SIZE 1 FVNR	MOTOR STARTER FVNR = FULL VOLTAGE NON-REVERSING FVR = FULL VOLTAGE REVERSING MCP = MOTOR CIRCUIT PROTECTOR RVNR = REDUCED VOLTAGE NON-REVERSING RVSS = REDUCED VOLTAGE SOFT START SIZE = NEMA STARTER SIZE

LIGHTING FIXTURE LEGEND

"A"	LED STRIP LIGHT; LETTER IN OR BESIDE FIXTURE IDENTIFIES IN FIXTURE SCHEDULE
"A"	LED STRIP LIGHT WITH BATTERY BACKUP; LETTER IN OR BESIDE FIXTURE IDENTIFIES IN FIXTURE SCHEDULE
?	LED FIXTURE, SURFACE OR SUSPENDED, CEILING MOUNTED
?	LED FIXTURE, STANCHION MOUNTED
?	LED FIXTURE, WALL MOUNTED
"X"	LED LIGHTED EXIT SIGN; LETTER IN OR BESIDE FIXTURE IDENTIFIES IN FIXTURE SCHEDULE
"D"	REMOTE EMERGENCY LIGHTS
"D"	POLE MOUNTED LED LUMINAIRE. SEE SCHEDULE OR NOTES FOR FIXTURE TYPE. ORIENT FIXTURE FOR CUT-OFF TOWARDS AREA TO BE LIT. ORIENT HOUSE SHIELD TOWARDS BUILDING. SEE DETAILS FOR POLE BASE. PROVIDE POLE CASE GROUND ROD.
"E"	EMERGENCY LED LIGHT FIXTURE, SELF CONTAINED, BATTERY OPERATED
"D"	PAR LAMP HOLDER. NUMBER OF TRIANGLES INDICATE NUMBER OF FIXTURES.
"D"	POLE MOUNTED FLOOR LIGHT. NUMBER OF TRIANGLES INDICATE NUMBER OF FIXTURES. ARROW DENOTES FLOODING AND DIRECTION POLE FOLDS DOWN.

ABBREVIATIONS

1/C	ONE CONDUCTOR
3/C	THREE CONDUCTOR
A	AMPERES OR TRIP AMPERES
AC	ALTERNATING CURRENT
A/C	AIR CONDITIONING
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AIC	SYMMETRICAL AMPERES INTERRUPTING CAPACITY
BLDG	BUILDING
BKR	BREAKER
C	CONDUIT
CAP	CAPACITOR
CKT	CIRCUIT
CONT'D	CONTINUED
CPT	CONTROL POWER TRANSFORMER
CT	CURRENT TRANSFORMER
CU	COPPER
DBL	DOUBLE
DISC SW.	DISCONNECT SWITCH
DC	DIRECT CURRENT
EMER.	EMERGENCY
EMT	ELECTRICAL METALLIC TUBING
ENCL.	ENCLOSURE
EP	EXPLOSION PROOF
EQUIP.	EQUIPMENT
FS	FLOAT SWITCH
G	GROUND WIRE
GALV.	GALVANIZED
GEN	GENERATOR
GFI	GROUND FAULT INTERRUPTER CIRCUIT
GND	GROUND
HDG	HOT DIPPED GALVANIZED
HPS	HIGH PRESSURE SODIUM
HT	HEIGHT
HZ	HERTZ
INST.	INSTRUMENT
KV	KILOVOLTS
KVA	KILOVOLTS AMPERES
KWH	KILOWATT HOURS
LA	LIGHTNING ARRESTOR
LPR	LIGHTING PROTECTION RELAY
L-L	LINE TO LINE
L-N	LINE TO NEUTRAL
MCC	MOTOR CONTROL CENTER
MFR	MANUFACTURER
MIN.	MINIMUM
MPR	MOTOR PROTECTION RELAY
MTD	MOUNTED
MTG	MOUNTING
MRCT	MULTI-RATIO CURRENT TRANSFORMER
MV	MERCURY VAPOR
N.C.	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION
NEUT.	NEUTRAL
N.O.	NORMALLY OPEN
N.T.S.	NOT TO SCALE
OC	ON CENTER
OH	OVERHEAD
P	POLE
PC	PHOTOCELL
PH	PHASE
PNL	PANEL
PRI	PRIMARY
PVC	POLYVINYL CHLORIDE
REQ'D	REQUIRED
SCH	SCHEDULE
SEC	SECONDARY
S/N	SOLID NEUTRAL
SPACE	SPACE(S) ONLY - NO BREAKER OR DEVICE
SPARE	SPARE BREAKER OR DEVICE
SPECS	SPECIFICATIONS
S.D. BARE	SOFT DRAWN BARE
SS HDWE	STAINLESS STEEL HARDWARE
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
TB	TERMINAL BLOCK
TYP.	TYPICAL
UL	UNDERWRITERS LABORATORIES
V	VOLTS
VA	VOLT AMPERES
W	WATTS
W/	WITH
W/O	WITHOUT
WP	WEATHERPROOF
XFMR	TRANSFORMER

NO.	REVISION	DATE

STATE OF TEXAS
RICARDO GUZMAN
134592
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PROFESSIONAL ENGINEER
JUNE 8, 2026

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TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

WATER PLANT NO. 2 CDBG IMPROVEMENTS
CITY OF PRAIRIE VIEW, TEXAS
ELECTRICAL
ABBREVIATIONS, LEGENDS, AND GENERAL NOTES

PLAT NO.
JOB NO. 42241-00
DATE JUNE 2026
DESIGNER SK
CHECKED RG DRAWN JA
SHEET 4

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GENERAL NOTES:

1. INSTALLATION SHALL BE PER LATEST VERSION OF NATIONAL ELECTRICAL CODE, AND ALL APPLICABLE LOCAL CODES/ORDINANCES. NOT ALL CODE AND STANDARD REQUIREMENTS MAY BE SHOWN ON PLANS. CONTRACTOR SHALL ADHERE TO CODES AND STANDARDS REGARDLESS OF BEING SHOWN ON PLANS OR SPECIFICATIONS IN DETAILED FASHION.

2. THE NOTES CONTAINED ON THIS SHEET ARE PROVIDED FOR THE CONVENIENCE OF THE CONTRACTOR WHEN WORKING IN THE FIELD.

3. ALL EQUIPMENT, WIRING, ETC. SHALL BE INSTALLED AND GROUNDED IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE, LOCAL CODES, AND INDUSTRY STANDARDS (I.E. UL, NEMA, IEEE, ANSI, ETC.) THE DRAWING NOTES AND DETAILS SHALL BE COMPLIED WITH, IN ADDITION TO THE REQUIREMENTS IN THE SPECIFICATIONS.

4. ALL RACEWAY INSTALLATIONS SHALL BE INSTALLED IN A MANNER TO PREVENT CONFLICTS WITH EQUIPMENT AND STRUCTURAL CONDITIONS. ALL EXPOSED RACEWAY SHALL BE INSTALLED PARALLEL TO BEAMS, CEILINGS, FLOORS AND WALLS.

5. CONDUITS SHALL BE TERMINATED IN A NEAT AND WORKMANLIKE MANNER STRICTLY IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS AND THE NATIONAL ELECTRICAL CODE.

6. CONDUITS TERMINATED INTO ENCLOSURES SHALL BE PERPENDICULAR TO THE WALLS OF THE ENCLOSURE. THE USE OF SHORT SEAL TIGHT ELBOW FITTINGS FOR SUCH TERMINATIONS WILL NOT BE PERMITTED.

7. ALL RACEWAY INSTALLATIONS, CROSSING EXPANSION JOINTS OR TRANSITIONS FROM BELOW GRADE TO EXPOSED ABOVE GRADE, SHALL HAVE EXPANSION OR EXPANSION/DEFLECTION TYPE FITTINGS AS SPECIFIED FOR THE APPLICATION. CONTRACTOR SHALL COORDINATE WITH VENDORS AND MANUFACTURER'S AS REQUIRED.

8. NO CONDUIT SMALLER THAN 1 IN., NOR WIRE SMALLER THAN NO. 12 AWG CU, SHALL BE PERMITTED UNLESS SPECIFICALLY NOTED.

9. ALL UNDERGROUND SINGLE CONDUITS, AND DUCTBANKS WITH MULTIPLE CONDUITS, SHALL BE RIGID PVC SCHEDULE 80 CONDUIT ENCASED IN REINFORCED RED CONCRETE. CONCRETE SHALL BE DYED RED PRIOR TO PLACEMENT. THE CONTRACTOR SHALL FIELD VERIFY THE ROUTING OF ALL EXISTING UNDERGROUND UTILITIES. CONTRACTOR MAY UTILIZE MEDIUM WALL REINFORCED THERMOSETTING RESIN (MW--RTRC) IN LIEU OF PVC SCH 80 AND PVC COATED RGS.

10. ALL CHANGES OF DIRECTION GREATER THAN 20 DEGREES IN UNDERGROUND SINGLE, OR DUCTBANKS OF MULTIPLE CONDUITS, SHALL BE ACCOMPLISHED USING PVC COATED RGS LONG RADIUS BENDS. BENDS OF PVC CONDUIT GREATER THAN 20 DEGREES, OR THE USE OF FLEXIBLE CONDUIT OF ANY TYPE, WILL NOT BE PERMITTED.

11. LIQUID TIGHT FLEXIBLE ALUMINUM CONDUIT SHALL BE USED FOR THE PRIMARY AND SECONDARY OF TRANSFORMERS, GENERATOR TERMINATIONS, AND OTHER EQUIPMENT WHERE VIBRATION IS PRESENT. USE IN OTHER LOCATIONS IS NOT PERMITTED EXCEPT FOR CONNECTIONS TO INSTRUMENTATION TRANSMITTERS WHERE MULTIPLE PENETRATIONS ARE REQUIRED.

12. LIQUID TIGHT FLEXIBLE ALUMINUM CONDUIT SHALL HAVE A MAXIMUM LENGTH NOT GREATER THAN THAT OF A FACTORY MANUFACTURED LONG BEND RADIUS ELBOW OF CONDUIT TRADE SIZE USED. THE MAXIMUM BENDING RADIUS SHALL NOT BE LASS THAN THAT SHOWN IN NEC CHAPTER 9, TABLE 2.

13. THE WIRING DIAGRAMS, BLOCK DIAGRAMS, QUANTITIES, SIZE OF WIRES, AND CONDUIT REPRESENT A SUGGESTED ARRANGEMENT BASED UPON SELECTED STANDARD COMPONENTS OF ELECTRICAL EQUIPMENT. MODIFICATIONS ACCEPTABLE TO THE ENGINEER MAY BE MADE BY THE CONTRACTOR TO ACCOMMODATE EQUIPMENT APPROVED.

14. ALL MODIFICATIONS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. THE BASIC SEQUENCE AND METHOD OF CONTROL SHALL BE MAINTAINED AS INDICATED ON THE DRAWINGS AND/OR SPECIFIED.

15. ALL JUNCTION BOXES AND TERMINATION BOXES SHALL BE NEMA 4X STAINLESS STEEL.

16. WHERE RACEWAYS ENTER JUNCTION BOXES OR CONTROL PANELS CONTAINING ELECTRICAL OR INSTRUMENTATION EQUIPMENT, ALL ENTRANCES SHALL BE SEALED WITH LIQUID TIGHT SEALANT. TOP PENETRATIONS ARE NOT ACCEPTABLE.

17. ALL EQUIPMENT AND ELECTRICAL EQUIPMENT ENCLOSURE LOCATIONS, OR TERMINAL BOX LOCATIONS ARE APPROXIMATE. THE EXACT LOCATIONS SHALL BE COORDINATED WITH AND APPROVED BY OWNER/ENGINEER DURING CONSTRUCTION AT NO ADDITIONAL COST TO OWNER.

18. ALL EQUIPMENT AND ELECTRICAL EQUIPMENT DIMENSIONS ARE APPROXIMATE. ALL EQUIPMENT AND ELECTRICAL ENCLOSURES SHALL BE VERIFIED WITH EQUIPMENT SUPPLIERS. ALLOW FOR LOCATION CHANGES UP TO 40 FEET FOR ALL EQUIPMENT. INCLUDE IN BID PRICE. THE EXACT LOCATIONS OF ALL ELECTRICAL EQUIPMENT AND ROUTING OF ALL CABLES/CONDUITS SHALL BE COORDINATED WITH, AND APPROVED, BY THE OWNER/ENGINEER DURING CONSTRUCTION.

19. FINAL ROUTING PATH IS ULTIMATE RESPONSIBILITY OF CONTRACTOR.

20. PROVIDE CONDUIT SEALS FOR CONDUIT PENETRATIONS.

21. ALL SLOTTED CHANNEL, STRUT, WASHERS, SCREWS, NUTS, CONDUIT CLAMPS, ALL THREAD SPRING NUTS, AND MISCELLANEOUS MOUNTING HARDWARE SHALL BE 316 S.S.

22. LIGHTING FIXTURES SHALL BE MOUNTED ACCORDING TO THE MOUNTING HEIGHT GIVEN ON THE DRAWINGS. THE MOUNTING HEIGHT SHALL BE MEASURED FROM THE BOTTOM OF THE LIGHTING FIXTURE TO FINISHED FLOOR.

23. ALL CONDUITS AND WIRES SHOWN ON THE CONSTRUCTION DRAWINGS SHALL BE PROVIDED AND INSTALLED BY THE CONTRACTOR. GROUPING OF CONDUIT AND WIRE MAY BE MODIFIED IF APPROVED BY OWNER AND ENGINEER.

24. ALL CONDULETS SHALL HAVE 316 S.S. CLAMP COVERS WITH 316 S.S. CLAMPS AND SCREWS. SCREW DOWN COVERS ARE UNACCEPTABLE.

25. ALL BARE COPPER GROUNDING CONDUCTORS SHALL BE TINNED. ALL GROUND RODS SHALL BE COPPER CLAD STEEL 3/4 IN. BY 10 FT. LONG. ALL EXPOSED COPPER GROUND CABLES SHALL BE GREEN INSULATED CONDUCTORS. PROVIDE XHHW-2 INSULATION.

26. WHERE NOTES ON THE DRAWINGS INDICATED THAT THE CONTRACTOR SHALL FIELD-VERIFY, THE INTENT IS FOR THE CONTRACTOR TO INVESTIGATE TO THE EXTEND NECESSARY TO PROVIDE THE WORK AND MATERIALS PRIOR TO BIDDING AND INCLUDE ALL COSTS IN THE BID PRICE.

27. SHOULD THE CONTRACTOR NOT INVESTIGATE PER REQUIREMENTS, CONTRACT PRICE SHALL NOT BE INCREASED. ALL REQUIRED CHANGES ARE SOLE RESPONSIBILITY OF CONTRACTOR AT NO ADDITIONAL COST TO OWNER.

28. DIAGRAMS, SCHEMATICS, AND DETAILS ARE SHOWN ONLY TO ILLUSTRATE FUNCTIONAL RELATIONSHIPS BETWEEN COMPONENTS OF THE SYSTEM. CONTRACTOR SHALL SUBMIT EQUIPMENT, PRODUCT DATA, AND SHOP DRAWINGS INDICATING ACTUAL INSTALLATION METHODS AND EQUIPMENT TO BE INSTALLED. EQUIPMENT SHALL NOT BE INSTALLED UNTIL THE ENGINEER OF RECORD HAS REVIEWED SUBMITTAL AND TAKEN NO EXCEPTION OR GIVEN A CONDITIONAL ACCEPTANCE.

29. HANDLE, STORE, AND PROTECT EQUIPMENT AND MATERIALS TO PREVENT DAMAGE BEFORE AND DURING INSTALLATION IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATION. REPLACE DAMAGED OR DEFECTIVE ITEMS.

30. COORDINATE WORK WITH ALL OTHER TRADES. MAINTAIN CLEARANCES AND ADVISE OTHER TRADES OF CLEARANCE REQUIREMENTS FOR OPERATION, REPAIR, REMOVAL, AND TESTING OF EQUIPMENT.

31. DRAWINGS SHALL NOT BE SCALED FOR CONSTRUCTION INSTALLATION DIMENSIONS. EACH TRADE IS RESPONSIBLE FOR FIELD VERIFICATION OF DIMENSIONS AND SHALL PERFORM FIELD MEASUREMENTS PRIOR TO FABRICATION AND/OR PURCHASE OF ANY CABLES, EQUIPMENT AND MATERIAL. REPORT ANY ROUTING DISCREPANCIES IN WRITING TO ENGINEER OF RECORD.

32. ELECTRICAL CONTRACTOR SHALL HAVE A MASTER ELECTRICIAN ON STAFF, AND LICENSED FOR THE STATE IN WHICH THIS PROJECT IS LOCATED. AN ELECTRICIAN MUST BE PRESENT AT ALL TIMES DURING THE INSTALLATION AND ENERGIZING OF THE SYSTEM.

33. ALL MATERIALS AND DEVICES SHALL BE UL LISTED.

34. PROVIDE EQUIPMENT IDENTIFICATION LABELS FOR ALL MAJOR PIECES OF EQUIPMENT INCLUDING CABINETS, ENCLOSURES, MANHOLES AND PULLBOXES, UNLESS UNITS ARE SPECIFIED WITH THEIR OWN IDENTIFICATION WITHIN PLANS. SECURE ALL NAMEPLATE TO EQUIPMENT USING 316 SS SELF-TAPPING SCREWS. PROVIDE A NAMEPLATE SCHEDULE FOR ENGINEER AND REVIEW PRIOR TO FABRICATION. REFER TO SPECIFICATIONS FOR ADDITIONAL DETAIL.

35. ALL ABOVE GROUND CONDUIT INCLUDING ALL UNDERGROUND RISERS AND VERTICAL BENDS SHALL BE RIGID ALUMINUM. EMBEDDED PVC COATED RIGID ALUMINUM CONDUIT SHALL EXTEND A MINIMUM OF 18 IN. INTO CONCRETE BEFORE CONVERSION TO PVC.

36. CONTRACTOR IS ADVISED TO READ ALL ELECTRICAL RELATED SPECIFICATION SECTIONS PRIOR TO BIDDING AND CONSTRUCTION. SEE SPECIFICATIONS FOR LIST OF PRE-QUALIFIED ELECTRICAL CONTRACTORS AND PANEL FABRICATORS.

37. CIVIL, STRUCTURAL, ARCHITECTURAL, AND MECHANICAL PLANS MAY CONTAIN CRITICAL INFORMATION RELEVANT TO ELECTRICAL WORK AND SHOULD BE REVIEWED PRIOR TO BIDDING AND CONSTRUCTION.

38. CONDUIT RUNS INSTALLED BELOW-GRADE IN EARTH SHALL BE SCH 80 PVC. USE MANUFACTURER'S APPROVED CEMENT FOR JOINING COUPLINGS AND ADAPTERS. RUNS SHALL BE INSTALLED SO THAT THE TOP OF CONCRETE DUCTBANK IS A MINIMUM OF TWENTY FOUR INCHES (24 IN.) BELOW FINISHED GRADE. SUPPORT CONDUIT RUNS ON PLASTIC SPACERS AND ENCASE CONDUITS WITH 3,000 PSI REINFORCED CONCRETE DYED WITH RED CONCRETE DYE AT A RATE OF 12 POUNDS OF DYE PER CUBIC YARD OF CONCRETE. PROVIDE CLEARANCES AS SHOWN ON DETAIL DRAWINGS. COVER TOP OF CONCRETE TO FINISHED GRADE WITH SELECTED SOIL THAT IS FREE FROM CLODS, DEBRIS, ROCKS, AND THE LIKE. PNEUMATICALLY TAMP BACKFILL IN SIX INCHES (6 IN.) TO EIGHT INCHES (8 IN.) BELOW FINISHED GRADE. INSTALL CONTINUOUS RUN OF "BURIED ELECTRIC" MARKING TAPE AND COMPLETE BACKFILL TO FINISHED GRADE. CONTRACTOR'S MEAN AND METHODS SHALL PREVENT FLOATING OF CONDUIT AND REBAR DURING CONCRETE PLACEMENT. METAL TO METAL CONTACT BETWEEN THE EARTH AND REBAR CAGE IS NOT ALLOWED.

39. ALL MOTOR STARTERS SHALL HAVE OVERLOAD DEVICES CONFIGURED FOR MOTOR PROTECTION. ALL PROTECTION ITEMS MAY NOT BE SHOWN ON DRAWINGS. CONTRACTOR IS FULLY RESPONSIBLE FOR REQUIRED MOTOR PROTECTION EQUIPMENT PER MANUFACTURER RECOMMENDATIONS.

NO.	REVISION	DATE

STATE OF TEXAS
RICARDO GUZMAN
134592
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JUNE 8, 2026

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TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

WATER PLANT NO. 2 CDBG IMPROVEMENTS
CITY OF PRAIRIE VIEW, TEXAS
ELECTRICAL
GENERAL NOTES

PLAT NO.
JOB NO. 42241-00
DATE JUNE 2026
DESIGNER SK
CHECKED RG DRAWN JA
SHEET 5

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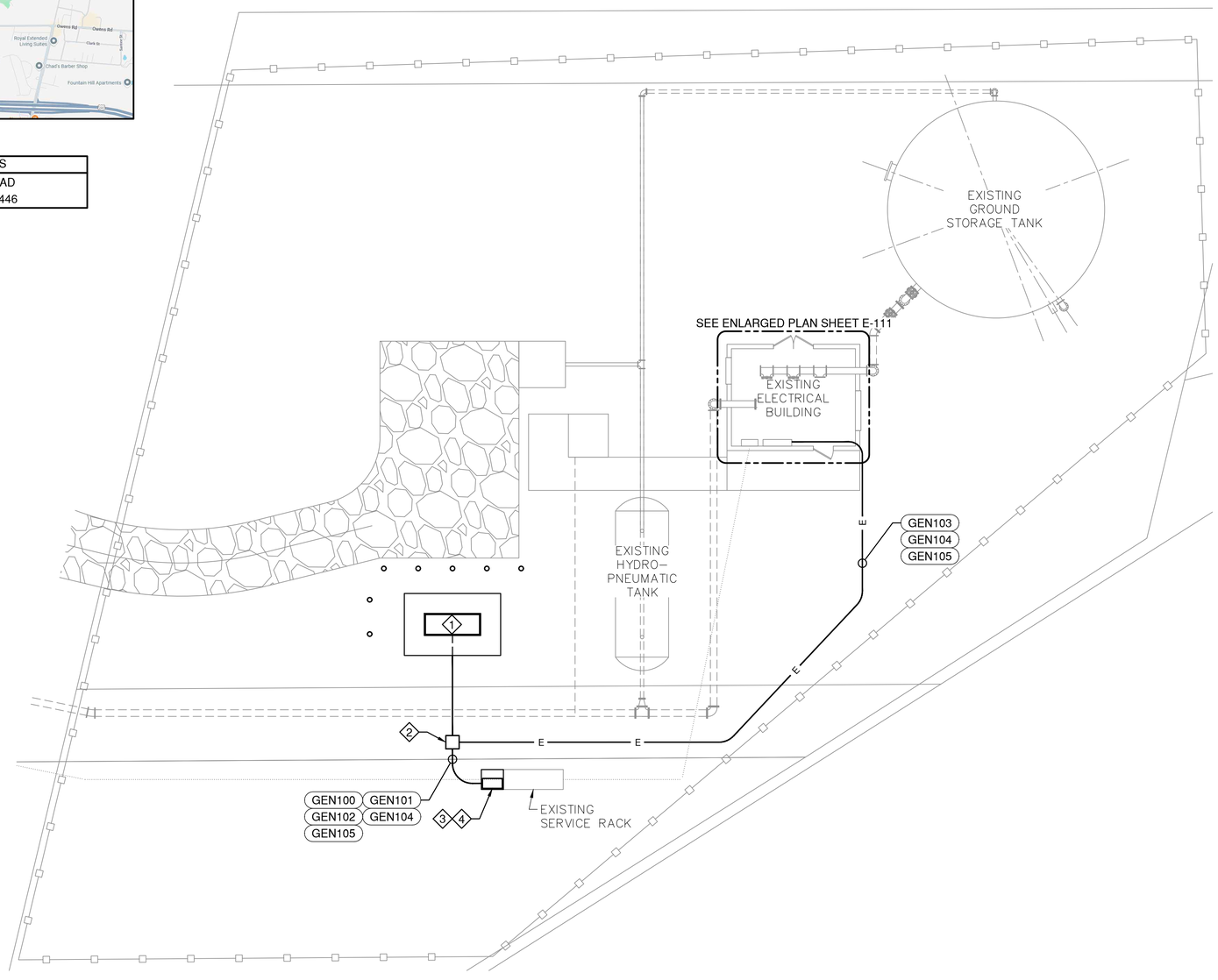


VICINITY MAP

PROJECT ADDRESS
36132 CAMERON ROAD PRAIRIE VIEW, TX 77446

0 10' 20'

SCALE: 1 IN. = 10 FT.



ELECTRICAL SITE PLAN

SCALE: 1 IN. = 10 FT.

KEYED NOTES:

1. 480V, 3 PHASE, 250 KW DIESEL GENERATOR.
2. PULL BOX (TYPICAL)
3. PROPOSED AUTOMATIC TRANSFER SWITCH.
4. COORDINATE WITH OPERATIONS FOR PLANNED OUTAGE. ATS SHALL BE INSTALLED IN PLACE OF EXISTING MAIN DISCONNECT, OR WHERE REQUIRED, TO MINIMIZE NEED FOR ADDITIONAL CONDUCTORS OR SPLICING.

GENERAL NOTES:

1. REFER TO CONDUIT SCHEDULE FOR FULL CONDUIT AND CABLE REQUIREMENTS.
2. CONDUITS SHALL NOT BE INSTALLED UNDERNEATH CONCRETE STRUCTURES, MEANS OF EGRESS, OR WALKWAYS. ROUTE AROUND EQUIPMENT AND AVOID CONFLICT WITH OTHER UNDERGROUND EQUIPMENT.
3. EQUIPMENT SHALL NOT BE INSTALLED WITHIN ELECTRICAL EASEMENTS. WHERE EASEMENT CONFLICT EXISTS, CONTACT ENGINEER PRIOR TO INSTALLATION. CONTRACTOR IS RESPONSIBLE FOR VERIFICATION OF ANY AND ALL EASEMENTS.
4. DO NOT INSTALL CONCRETE FOR EQUIPMENT OR DUCTBANK OVER WATER OR SEWER LINES. FIELD VERIFY AND MARK ALL UNDERGROUND LINES.
5. EQUIPMENT SHOWN MAY NOT TO BE SCALE. REFER TO ALL PLAN SHEETS AND ELECTRICAL DETAILS FOR ADDITIONAL INFORMATION. REFER TO CIVIL DRAWINGS FOR SITE DIMENSIONS.
6. INSTALLATION SHALL BE PER LATEST VERSION OF NATIONAL ELECTRICAL CODE, AND ALL APPLICABLE LOCAL CODES/ORDINANCES. NOT ALL CODE AND STANDARD REQUIREMENTS MAY BE SHOWN ON PLANS. CONTRACTOR SHALL ADHERE TO CODES AND STANDARDS REGARDLESS OF BEING SHOWN ON PLANS OR SPECIFICATIONS IN DETAILED FASHION.
7. PROVIDE ADEQUATE WORKING SPACE FOR ALL ELECTRICAL EQUIPMENT AND GENERATOR ENCLOSURE DOORS.
8. PROVIDE GROUND CONNECTION AT SERVICE, PANELS, METALLIC EQUIPMENT AT RACK, PIPING, AND ALL METALLIC PARTS WITHIN PROJECT SITE.
9. CONCRETE SPOILS SHALL NOT BE DUMPED ON SITE. DO NOT OVER POUR DUCTBANKS. PROVIDE ADEQUATE FORMS PRIOR TO POUR.
10. REFER TO SPECIFICATIONS AND ENTIRE DRAWING PACKAGE PRIOR TO BID FOR FULL PROJECT REQUIREMENTS.
11. ALL EQUIPMENT SHOWN IS NEW UNLESS STATED OTHERWISE.
12. ALL ELECTRICAL EQUIPMENT CONCRETE FOUNDATIONS ARE TO BE INSTALLED ABOVE FINISHED GRADE. ADDITIONAL ELEVATION DUE TO FLOOD PLANE REQUIREMENTS ARE NOT SHOWN. REFER TO CIVIL SHEETS FOR FLOOD PLAIN LEVEL AND MINIMUM FOUNDATION HEIGHT REQUIREMENTS.
13. COORDINATE CONDUIT STUB-UP LOCATIONS WITH GENERATOR MANUFACTURER PRIOR TO POURING HOUSEKEEPING PAD.
14. COORDINATE FINAL GENERATOR ENCLOSURE DIMENSIONS PRIOR TO POURING HOUSEKEEPING PAD. CONTRACTOR SHALL SIZE HOUSEKEEPING PAD 6 IN. LARGER ON ALL SIDES THAN ENCLOSURE. REFER TO ELECTRICAL DETAILS FOR ADDITIONAL REQUIREMENTS.
15. ANY DAMAGE TO EXISTING LINES AS A RESULT FROM WORK SHALL BE REPAIRED AT NO COST TO THE OWNER. FIELD VERIFY ALL UNDERGROUND OBJECTS PRIOR TO BEGINNING WORK.

NO.	REVISION	DATE

STATE OF TEXAS
RICARDO GUZMAN
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LICENSED PROFESSIONAL ENGINEER
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WATER PLANT NO. 2 CDBG IMPROVEMENTS
CITY OF PRAIRIE VIEW, TEXAS
ELECTRICAL
SITE PLAN

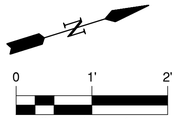
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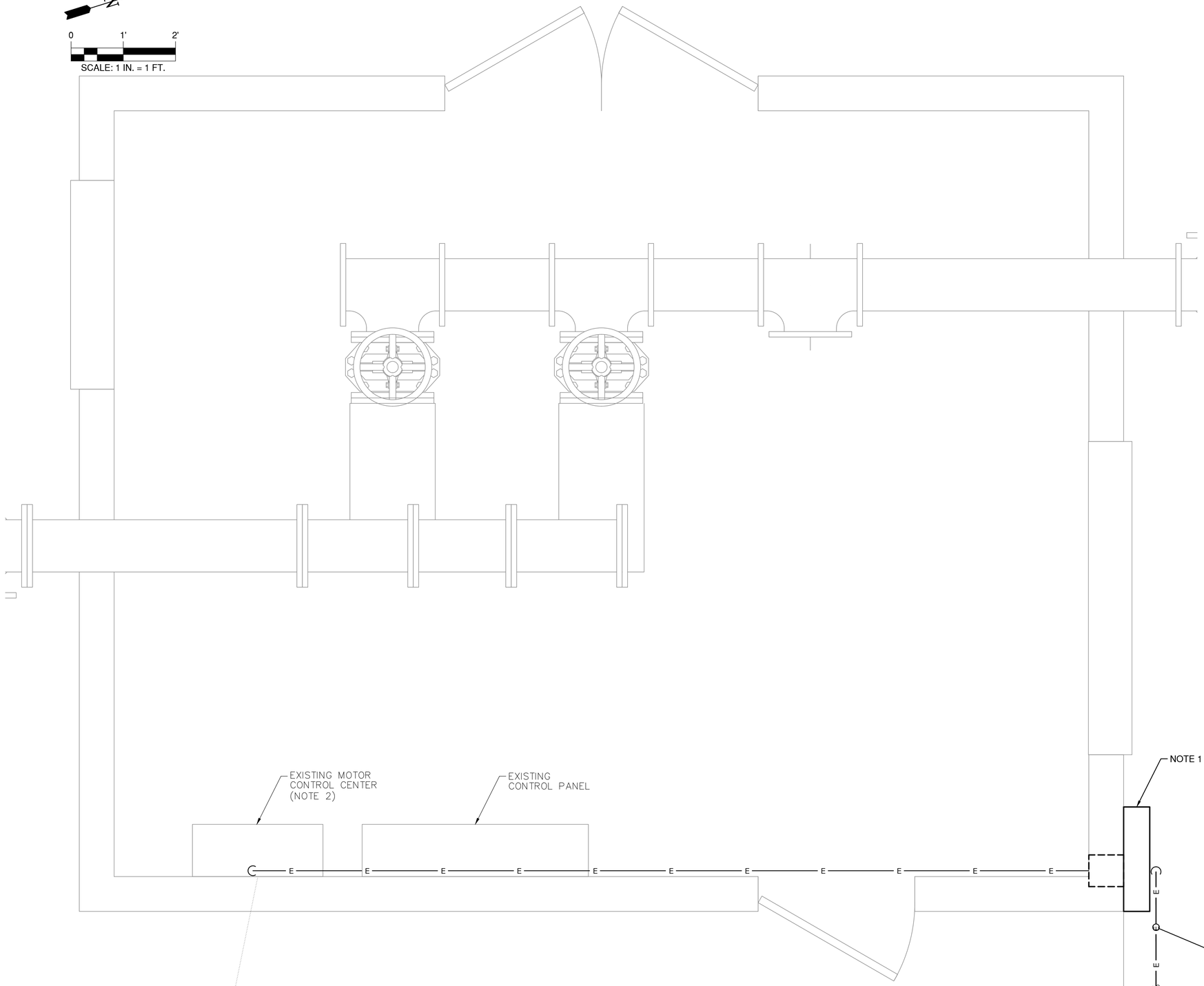
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ELECTRICAL ENLARGED PLAN

SCALE: 1 IN. = 1 FT.

NOTES:

1. PENETRATE HIGH ON WALL UTILIZE LB CONDULETTE OR NEMA 4X 316 S.S. JUNCTION BOX. SEAL PEENTRATION WITH LIQUID TIGHT GROUT. ROUTE CONDUIT HIGH ON WALL AND UTILIZE LISTED HARDWARE INTO EXISTING MCC. PROVIDE NEW MCC FEEDER BUCKET FOR GENERATOR MINI POWER ZONE. COORDINATE WITH VENDOR AS REQUIRED.

2. WHERE FEEDER BUCKET PRODUCTS ARE NOT READILY AVAILABLE, CONTRACTOR SHALL ALLOCATE IN BASE BID BUS TAP TO EXTERNAL WALL MOUNTED FEEDER TO FEED GENERATOR MINI POWER ZONE WITHIN GENERATOR ENCLOSURE.

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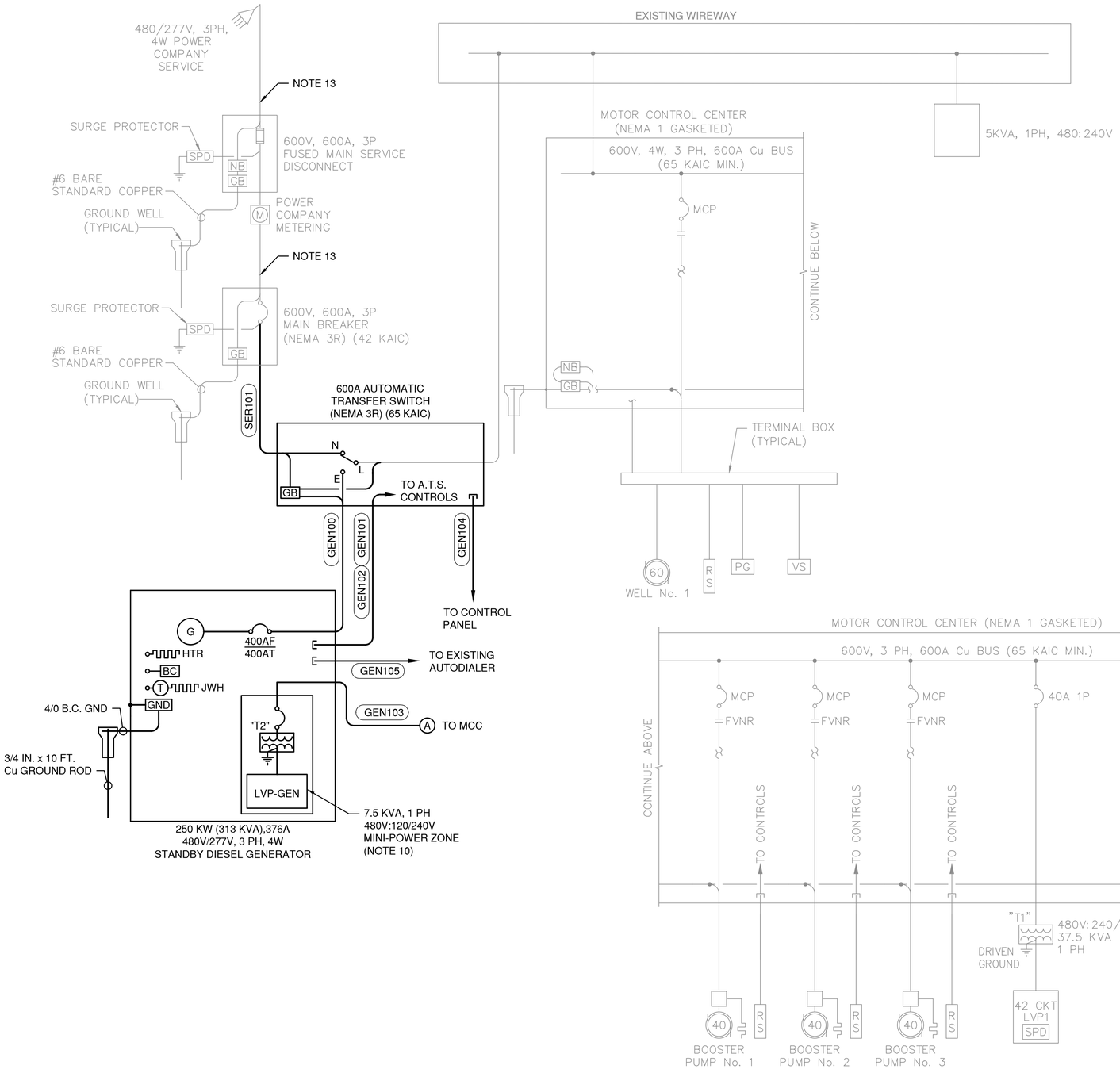
WATER PLANT NO. 2 CDBG IMPROVEMENTS
CITY OF PRAIRIE VIEW, TEXAS
ELECTRICAL
ENLARGED PLAN

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ELECTRICAL ONE-LINE DIAGRAM

NOTES:

1. ALL CONDUITS, CONDUCTORS AND DEVICES MAY NOT BE SHOWN ON THIS SHEET.
2. SEE CONDUIT SCHEDULE AND MOTOR DATA TABLE ON SCHEDULE SHEET FOR CONDUIT AND CONDUCTOR REQUIREMENTS.
3. INSTALL SURGE PROTECTOR ACCORDING TO MANUFACTURERS INSTRUCTIONS. SURGE PROTECTOR MUST CONFORM TO SPECIFICATIONS.
4. PROVIDE TRANSFER SWITCH DATA TO POWER COMPANY.
5. GROUND TRANSFORMER TO GENERATOR FRAME.
6. ALL ENCLOSURES, HARDWARE, STRAPS, AND ANCHORS TO BE 316 STAINLESS STEEL.
7. ALL CONTROL PANELS TO BE UL LISTED.
8. CONTRACTOR SHALL READ ENTIRE CONTENTS OF SPECIFICATIONS BEFORE BIDDING ON THIS PROJECT.
9. COORDINATE LVP BREAKER SIZES WITH GENERATOR MANUFACTURER FOR AUXILIARY LOADS.
10. ALL GENERATOR ANCILLARY EQUIPMENT SUCH AS, BUT NOT LIMITED TO, HEATERS, LIGHTS, AND BATTERY SHALL BE POWERED VIA THE PROPOSED VENDOR FURNISHED MINI POWER ZONE.
11. ALL UNDERGROUND CONDUITS SHALL BE PVC SCH. 80. ALL ABOVE GROUND CONDUITS SHALL BE PVC COATED RIGID GALVANIZED STEEL.
12. CONTRACTOR SHALL INTERCEPT SERVICE CONDUCTORS FROM MAIN BREAKER AND INSTALL IN PROPOSED AUTOMATIC TRANSFER SWITCH. PROVIDE AND INSTALL NEW CONDUCTORS AND CONDUIT FROM MAIN BREAKER TO PROPOSED AUTOMATIC TRANSFER SWITCH. LOCATE FROM MOTOR CONTROL CENTER TO SERVICE RACK.
13. CONTRACTOR SHALL REFER TO BID SHEET FOR ALLOWANCE RELATED TO REPLACING ENTIRE SERVICE FEEDER CIRCUITS FROM UTILITY TRANSFORMERS WHERE UNDERSIZED AND ALL OTHER UNFORESEEN ISSUES. EXISTING CONDUCTOR SIZING AND QUANTITY COULD NOT BE VERIFIED.

ELECTRICAL LOAD ANALYSIS

LOAD		AMPS PH A	AMPS PH B	AMPS PH C
WELL NO. 1	60HP	77	77	77
BOOSTER PUMP NO. 1	40HP	52	52	52
BOOSTER PUMP NO. 2	40HP	52	52	52
BOOSTER PUMP NO. 3	40HP	0	0	0
"T1" TRANSFORMER	37.5 KVA	78	0	78
"T2" TRANSFORMER	5KVA	11	0	11
"T2" TRANSFORMER (GENERATOR)	7.5KVA	16	0	16
25% OF LARGEST MOTOR		20	20	20
TOTAL LOAD		306	201	306
SERVICE AMPACITY @ 480/277V, 3PH, 4W		600	600	600
SPARE AMPACITY		294	399	294
GENERATOR LOAD		306	201	306
GENERATOR AMPACITY		376	376	376
GENERATOR SPARE		70	175	70

USE 65 KAIC RATED DEVICES AND BRACING

NO.	REVISION	DATE

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RICARDO GUZMAN
134592
LICENSED PROFESSIONAL ENGINEER
JUNE 8, 2026

PAPE-DAWSON
2107 CITYWEST BLVD, 3RD FLR I HOUSTON, TX 77042 I 713.426.2400
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

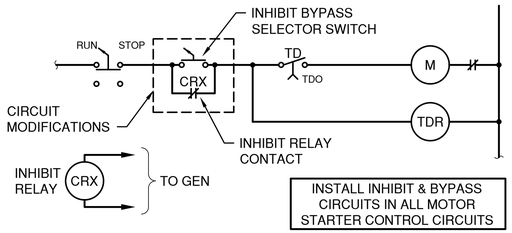
WATER PLANT NO. 2 CDBG IMPROVEMENTS
CITY OF PRAIRIE VIEW, TEXAS
ELECTRICAL
ONE-LINE DIAGRAM

PLAT NO.
JOB NO. 42241-00
DATE JUNE 2026
DESIGNER SK
CHECKED RG DRAWN JA
SHEET 8

GUZMAN ENGINEERING
F-26942
118 VINTAGE PARK BLVD.
SUITE: W310
HOUSTON, TX 77070
P: (979) 324-4120
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NOTES:
1. PROVIDE INHIBIT RELAYS AND BYPASS SWITCHES FOR ALL MOTOR LOADS TO LIMIT LOADS WHEN ON STANDBY GENERATOR POWER.

2. LOCATE INHIBIT SWITCH ADJACENT TO HOA SWITCH.

GENERATOR INHIBIT SWITCH DIAGRAM
(TYPICAL)

NOTES:
1. COORDINATE WITH OPERATIONS TO INSTALL GENERATOR INHIBIT SWITCHES DURING UTILITY FAILURES.

NO.	REVISION	DATE

STATE OF TEXAS
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TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

WATER PLANT NO. 2 CDBG IMPROVEMENTS
CITY OF PRAIRIE VIEW, TEXAS
ELECTRICAL
CONTROL DIAGRAMS

PLAT NO.
JOB NO. 42241-00
DATE JUNE 2026
DESIGNER SK
CHECKED RG DRAWN JA

SHEET 9

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NOTE:
1. ALL SERVICE AND MOTOR FEEDER CONDUCTORS TO BE XHHW-2. LOW VOLTAGE CONDUCTORS IN FEEDER CONDUIT TO BE 600V RATED.

2. COORDINATE WITH GENERATOR VENDOR FOR RECOMMENDED LVP SIZE AND ANCILLARY DEVICES.

CONDUIT SCHEDULE

CONDUIT TAG	CONDUIT QUANTITY	CONDUIT SIZE	FROM	TO	CONDUCTOR (EACH CONDUIT)	CABLE TYPE	NOTES
GEN100	2	3 IN.	GENERATOR	AUTOMATIC TRANSFER SWITCH	3-350 KCMIL + #2 GND	XHHW-2	EMERGENCY POWER
GEN101	1	1 & 1/2 IN.	AUTOMATIC TRANSFER SWITCH	GENERATOR	4-#14 + #14 GND	THWN-2	GENERATOR START/STOP, FAIL
GEN102	1	1 & 1/2 IN.	AUTOMATIC TRANSFER SWITCH	GENERATOR	ANNUNCIATOR	-	GENERATOR ANNUNCIATOR
GEN103	1	1 & 1/2 IN.	MOTOR CONTROL CENTER	GENERATOR - LOW VOLTAGE PANEL	2-#10 + #8 GND	XHHW-2	GENERATOR LOW VOLTAGE PANEL
GEN104	1	1 & 1/2 IN.	CONTROL PANEL - INHIBITS	PROPOSED ATS	4-#14 + #14 GND	THWN-2	ATS STATUS FOR PUMP INHIBITS
GEN105	1	1 IN.	GENERATOR	EXISTING AUTODIALER	6-#14 + #14 GND	THWN-2	AUTODIALER ALARMS
SER101	2	3 IN.	EXISTING MIAN DISCONNECT	PROPOSED ATS	3-350 KCMIL + #2 GND	XHHW-2	NEW SERVICE CONDCUTORS

PANEL LVP-GEN

PRIMARY VOLTAGE 480V
SECONDARY VOLTAGE 120/240V
MAIN BREAKER SIZE 70A

PHASE BUS RATING 70A
NEUTRAL BUS RATING 70A
SHORT CIRCUIT RATING 22 KAIC
LOCATION GEN. ENCLOSURE

WIRE SIZE #4
NEU WIRE SIZE #4
PHASE 1
MOUNTING SURFACE

WITH:
- ■ SOLID NEUTRAL & GROUND
- □ ISOLATED GROUND BUS
- □ 200% NEUTRAL

NOTE: ADJ. CKTS. TO BAL. PNL.

CKT. DESCRIPTION	WIRE	BREAKER POLE	BREAKER AMP	VA/WATTS A	VA/WATTS B	CKT NO.		CKT NO.	VA/WATTS A	VA/WATTS B	BREAKER POLE	BREAKER AMP	WIRE	CKT. DESCRIPTION
JACKET WATER HEATER NO. 1	10	1	30	2500		1		2	-		1	20	12	SPARE
ENCLOSURE RECEPTACLE	12	1	20		360	3		4		360	1	20	10	ENCLOSURE LIGHTS
SPARE	12	1	20	-		5		6	360		1	20	10	GENERATOR BATTERY CHARGER
EXHAUST FAN	12	1	20		500	7		8		750	1	20	12	GENERATOR SPACE HEATER
SPARE	12	1	20	-		9		10	-		1	20	12	SPARE
SPARE	12	1	20		-	11		12		750	1	20	12	GENERATOR BLOCK HEATER
SPARE	12	1	20	-		13		14	-		1	20	12	SPARE
SPARE	12	1	20		-	15		16		-	1	20	12	SPACE
SPACE	12	1	20	-		17		18			1	20	12	SPACE

TOTAL PHASE A: 2860 VOLT-AMPS
TOTAL PHASE B: 2720 VOLT-AMPS

TOTAL PHASE A CURRENT: 24 AMPS
TOTAL PHASE B CURRENT: 23 AMPS

TOTAL CONNECTED LOAD: 5580 VA

FAULT CURRENT CALCULATIONS

FROM	TO	AVAILABLE FAULT @ SOURCE	CONDUCTORS PER PHASE	WIRE SIZE	C	VOLTAGE	LENGTH	F	M	FAULT CURRENT @ LOAD	MINIMUM KAIC RATING
UTILITY	ATS	27200.60	2	3/0	13923	480	58 FT.	0.20	0.83	24725.63	42
ATS	MCC	24725.63	2	350 KCMIL	22737	480	115 FT.	0.23	0.82	22315.77	42
MCC	MPZ	22315.77	1	#10	981	480	119 FT.	9.77	0.09	4214.40	22

NOTES:
1. A PERMANENTLY AFFIXED LABEL HALL BE APPLIED WITH THE FAULT CURRENT AT THE TIME OF INSTALLATION AND FAULT STUDY. THE LABEL SHALL INCLUDE THE DATE OF THE CALCULATION. REFER TO SPECIFICATIONS.
2. ALL SERVICES SHALL BE IDENTIFIED WITH A PERMANENT LABEL AT EACH DISCONNECT PER NEC 230.2.
3. VERIFY NAMEPLATE AND MANUFACTURER'S REQUIREMENTS ON ALL MOTORS PRIOR TO ORDERING EQUIPMENT.

NO. | REVISION | DATE

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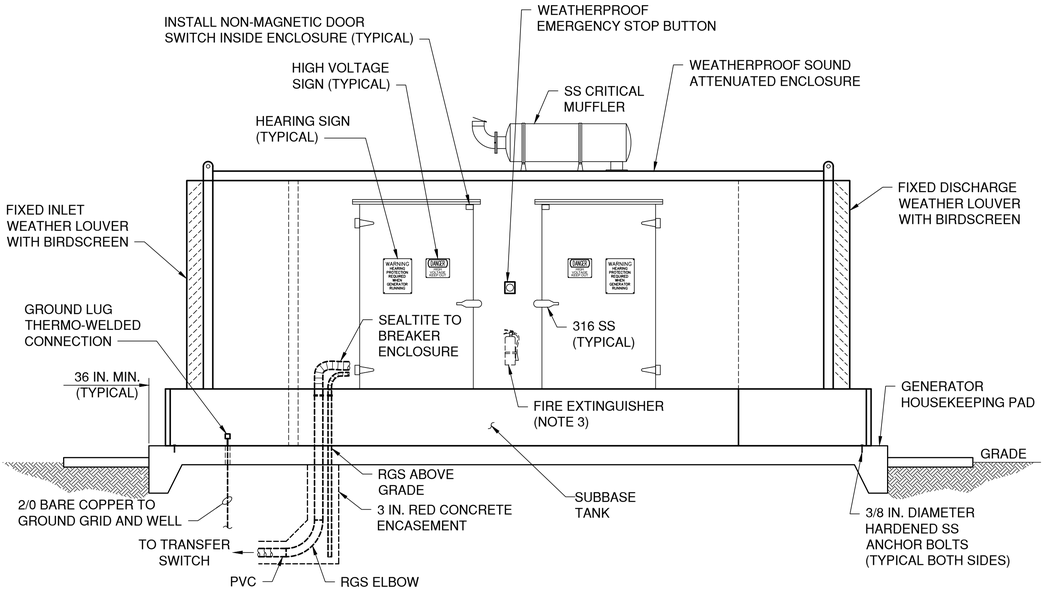
WATER PLANT NO. 2 CDBG IMPROVEMENTS
CITY OF PRAIRIE VIEW, TEXAS
ELECTRICAL SCHEDUELS

PLAT NO.
JOB NO. 42241–00
DATE JUNE 2026
DESIGNER SK
CHECKED RG DRAWN JA
SHEET 10

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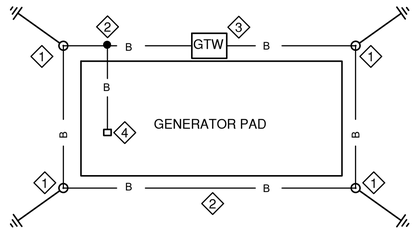
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NOTES:
1. COORDINATE CONDUIT LOCATIONS WITH GENERATOR MANUFACTURER PRIOR TO POURING CONCRETE.
2. PROVIDE BOX OF OSHA APPROVED EARPLUGS FOR NOISE REDUCTION WHEN SERVICING GENERATOR.
3. PROVIDE UL RATED CLASS B FIRE EXTINGUISHER, PROPLUS MODEL PROPLUS5MP FOR FUEL TYPE, PER GENERATOR MANUFACTURERS RECOMMENDATIONS AND FIELD LOCATE.
4. PROVIDE 4 FT. WIDE ELEVATED WALKWAY (NOT SHOWN) IN FRONT OF GENERATOR ACCESS PANELS (WITH STAIRS AS REQUIRED) SUCH THAT BOTTOM OF WALKWAY IS LEVEL WITH TOP OF SUB-BASE TANK.

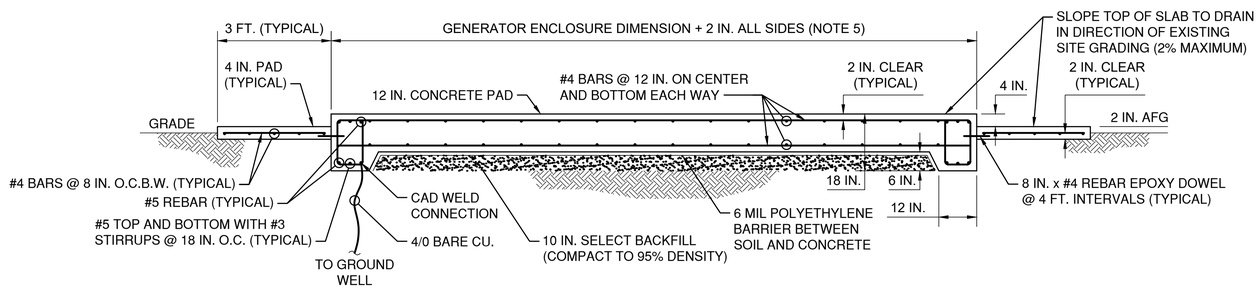
SOUND ATTENUATED GENERATOR ENCLOSURE DETAIL
N.T.S.



NOTE:
1. THE GROUNDING SYSTEM SHALL BE TESTED BY AN APPROVED TESTING FIRM TO ENSURE THE RESISTANCE TO GROUND IS NO GREATER THAN 5 OHMS. CONTRACTOR TO SUBMIT GROUND TESTING REPORT TO OWNER'S REPRESENTATIVE.

KEYED NOTES:
1. 3/4 IN. x 10 FT. COPPER CLAD GROUNDROD. EXOTHERMICALLY WELD TO GROUND CABLE BURIED 18 IN. (MINIMUM) BELOW GRADE.
2. 4/0 SOFT DRAWN BARE COPPER CABLE BURIED 18 IN. (MINIMUM) BELOW GRADE (TYPICAL ALL BELOW GRADE CABLE). EXOTHERMICALLY WELD ALL BELOW GRADE CONNECTIONS.
3. REFER TO GROUNDING ROD INSTALLATION DETAIL.
4. EXTEND #2 SOFT DRAWN BARE COPPER CABLE UP INTO AUTOMATIC TRANSFER SWITCH AND GROUND TO GROUND BUS.

TYPICAL GENERATOR ELECTRICAL GROUNDING DETAIL
N.T.S.



NOTES:
1. COMPACT EARTH FILL TO MINIMUM DRY DENSITY OF 95% OF MAXIMUM IN ACCORDANCE WITH ASTM D698-78 TO ENSURE THAT LOCALIZED WEAK AND COMPRESSIBLE ZONES ARE NOT PRESENT.
2. ALL CONCRETE SHALL HAVE 4,000 PSI @ 28 DAYS. REINFORCED STEEL SHALL BE GRADE 60.
3. PLACE ALL REINFORCING STEEL 2 IN. CLEAR FROM FACE OF CONCRETE.
4. GROUND ALL REBAR PER NEC 250-50.
5. COORDINATE GENERATOR ENCLOSURE DIMENSIONS AND ADJUST SLAB SIZE ACCORDINGLY PRIOR TO CONSTRUCTION.

GENERATOR CONCRETE HOUSEKEEPING PAD DETAIL
N.T.S.

GENERAL NOTES:
1. CONDUCTING GENERATOR TESTS, SET MOTOR STARTER TIME DELAY RELAYS IN THE ORDER OF MOTOR SIZE SMALLEST TO LARGEST, WITH FIRST SETTING AT 10 SECONDS AND EACH CONSECUTIVE TIME DELAY AT 10 SECOND GREATER INCREMENTS. I.E. P1 TD = 10 SEC; P2 TD = 20 SEC, P3 TD = 30 SEC., ETC. THESE SETTINGS SHOULD NEVER BE CHANGED TO ASSURE PROPER LOAD SEQUENCING ON GENERATOR. RECORD SETTINGS AND INCLUDE IN RECORD-BUILT.
2. PROVIDE DGC2020 DIGITAL CONTROLLER, OR APPROVED EQUAL, WITH RJ-45 COMMUNICATION TO ETHERNET SWITCH.
3. GENERATOR SHALL NOT HAVE OBJECTS NEAR THE GENERATOR THAT PREVENT FULLY OPENING THE GENERATOR DOORS. WHERE FUEL TANK EXCEEDS 24 IN. IN HEIGHT, CONTRACTOR SHALL PROVIDE A WRAP AROUND PLATFORM WITH STAIRS FOR OPERATIONAL AND MAINTENANCE ACCESS. CONTRACTOR SHALL SUBMIT A PLATFORM STRUCTURAL SUBMITTAL SIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN TEXAS WITH EXPERIENCE IN THE LOCAL AREA FOR DESIGN ENGINEER REVIEW. THE RAILINGS SHALL BE SPACED TO ALLOW FOR FULL SWING FOR THE GENERATOR DOORS.

GENERATOR & TANK DATA	
ITEMS	DATA
GENERATOR*	250 KW (MIN.), 313 KVA, 376 A FUEL CONSUMPTION RATE FULL LOAD - 16.55 GPH WT = 5,500 LBS.
ENCLOSURE*	WT = 7,750 LBS DIM. 162 IN. L X 66 IN. W X 81 IN. H
TANK*	1,000 GALLON SUB-BASE TANK
NFPA 110	CLASS 48, TYPE 10, LEVEL 2
AVAILABLE RUN TIME (AT FULL)	1,000 GAL / 16.55 GAL/HR = 60.42 HRS

* VERIFY EQUIPMENT PARAMETERS WITH THE SPECIFIC MANUFACTURER

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TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

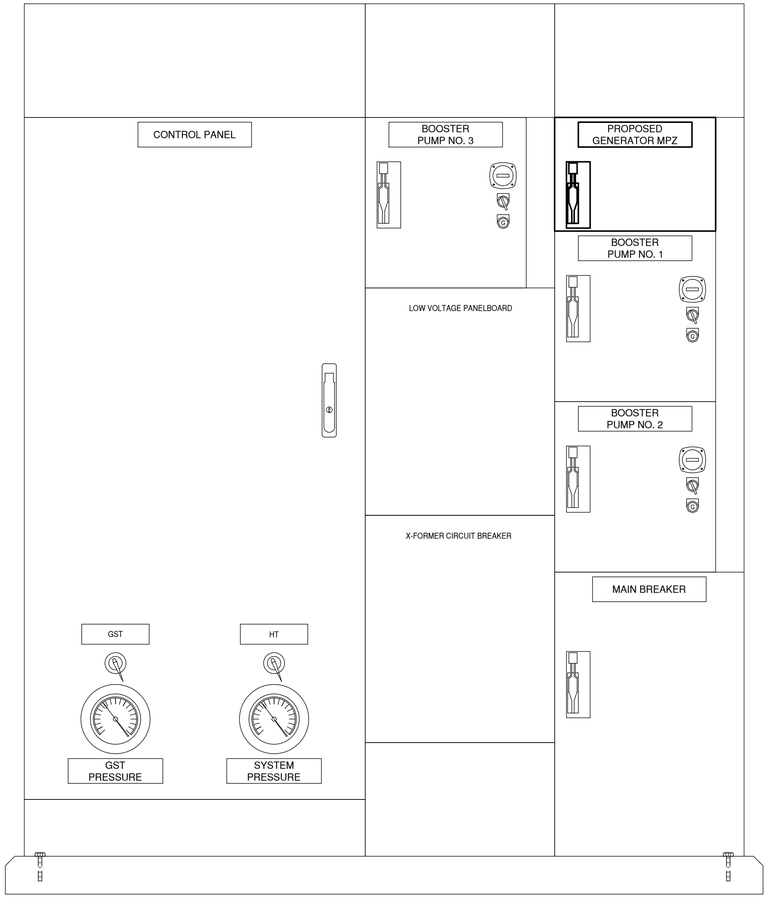
WATER PLANT NO. 2 CDBG IMPROVEMENTS
CITY OF PRAIRIE VIEW, TEXAS
ELECTRICAL DETAILS
SHEET 1

PLAT NO.
JOB NO. 42241-00
DATE JUNE 2026
DESIGNER SK
CHECKED RG DRAWN JA
SHEET 11

GUZMAN ENGINEERING
118 VINTAGE PARK BLVD.
SUITE: W310
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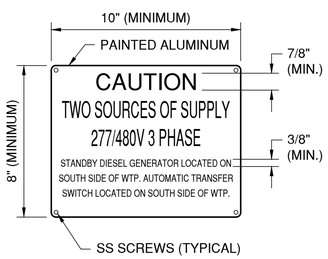


EXISTING MOTOR CONTROL CENTER DETAIL
N.T.S.

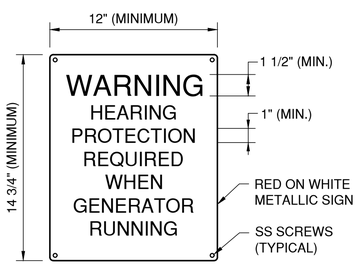


MCC ELEVATION
N.T.S.

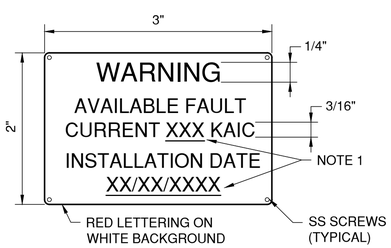
NOTES:
1. IMAGE SHOWN FOR CLARITY ONLY.



DUAL SOURCE SIGN DETAIL
N.T.S.

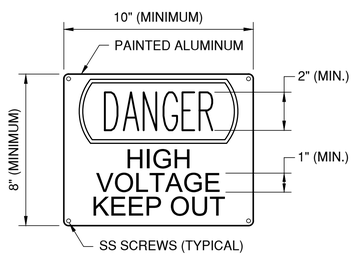


HEARING WARNING SIGN DETAIL
N.T.S.



NOTE:
1. CONTRACTOR TO FILL AVAILABLE FAULT CURRENT KAIC BASED ON DATA OUTLET STATEMENT FROM ELECTRICAL PROVIDER.

FAULT CURRENT WARNING SIGN DETAIL
N.T.S.



HIGH VOLTAGE SIGN DETAIL
N.T.S.

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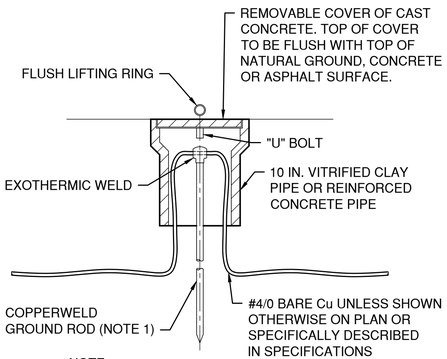
WATER PLANT NO. 2 CDBG IMPROVEMENTS
CITY OF PRAIRIE VIEW, TEXAS
ELECTRICAL DETAILS
SHEET 2

PLAT NO.
JOB NO. 42241-00
DATE JUNE 2026
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SHEET 12

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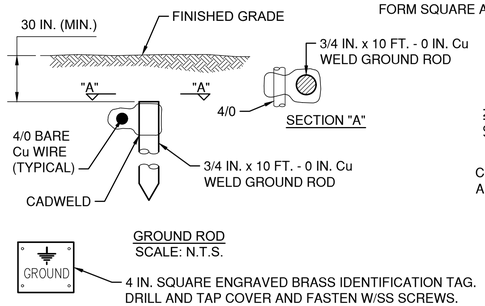
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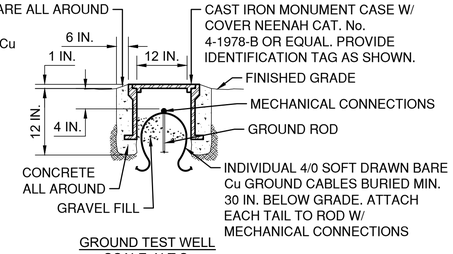


NOTE:
1. GROUND ROD SHALL BE 3/4 IN. x 10 FT.

GROUND WELL DETAIL
SCALE: N.T.S.



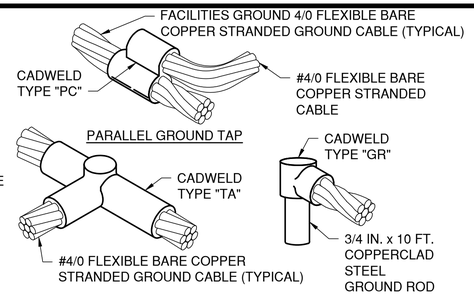
GROUND ROD
SCALE: N.T.S.



GROUND TEST WELL
SCALE: N.T.S.

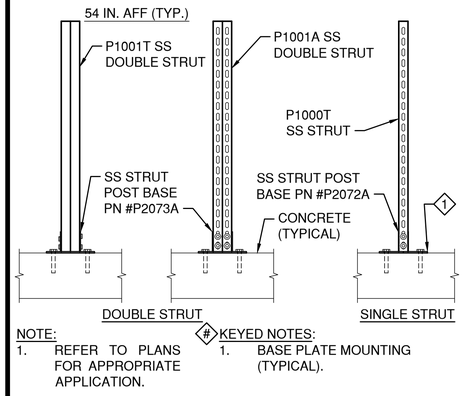
NOTES:
1. ANY EXPOSED OR ABOVE GRADE CONNECTIONS SHALL BE MECHANICAL TYPE WITH CRIMP LUGS. USE CADWELD FOR BURIED LOCATIONS.
2. EXOTHERMICALLY WELD ALL BELOW GRADE CONNECTIONS.
3. EXTEND #2 SOFT DRAWN BARE COPPER CABLE UP INTO ATS/EQUIPMENT PANELS AND GROUND TO GROUND BUS.

GROUNDING SYSTEM TEST WELL DETAIL
SCALE: N.T.S.



NOTE:
1. SPRAY ALL EXPOSED GROUNDING CONNECTORS AND CABLE WITH SCOTCHKOTE CORROSION PROTECTION - APPLY SEPARATE COATS; TWO MINIMUM ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

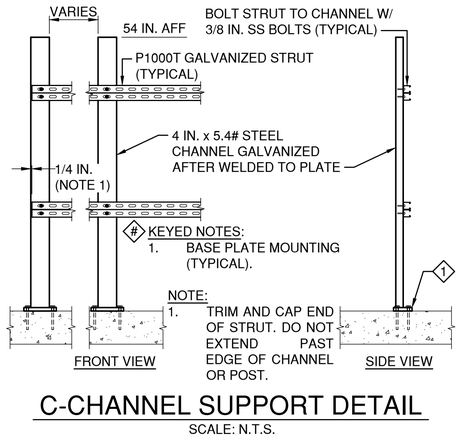
GROUNDING CONNECTION DETAIL
SCALE: N.T.S.



NOTE:
1. REFER TO PLANS FOR APPROPRIATE APPLICATION.

KEYED NOTES:
1. BASE PLATE MOUNTING (TYPICAL).

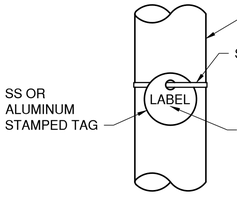
STRUT SUPPORT DETAIL
SCALE: N.T.S.



KEYED NOTES:
1. BASE PLATE MOUNTING (TYPICAL).

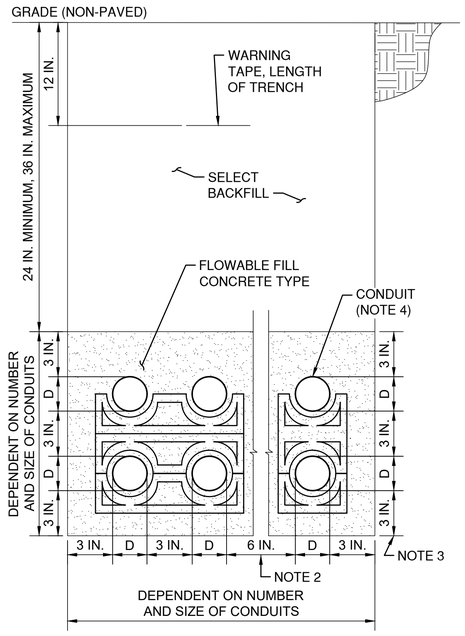
NOTE:
1. TRIM AND CAP END OF STRUT. DO NOT EXTEND PAST EDGE OF CHANNEL OR POST.

C-CHANNEL SUPPORT DETAIL
SCALE: N.T.S.



NOTE:
1. AS-BUILT DRAWINGS SHOULD CONTAIN RECORD OF ACTUAL INSTALLED CONDUITS AND CONDUCTORS THAT COORDINATE WITH FIELD LABELS. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

CONDUIT LABEL DETAIL
SCALE: N.T.S. / (TYPICAL)



NOTES:
1. D = NOMINAL CONDUIT TRADE SIZE PER PLAN.
2. MINIMUM SEPARATION OF POWER AND SYSTEMS IN COMMON TRENCH.
3. MINIMUM SEPARATION BETWEEN CONDUITS OF SAME TYPE.
4. CONDUIT SIZE INDICATED ON PLANS.

TYPICAL PRIMARY DUCT BANK SECTION DETAIL
SCALE: N.T.S.

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WATER PLANT NO. 2 CDBG IMPROVEMENTS
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ELECTRICAL DETAILS SHEET 3

PLAT NO.
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SHEET 13

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